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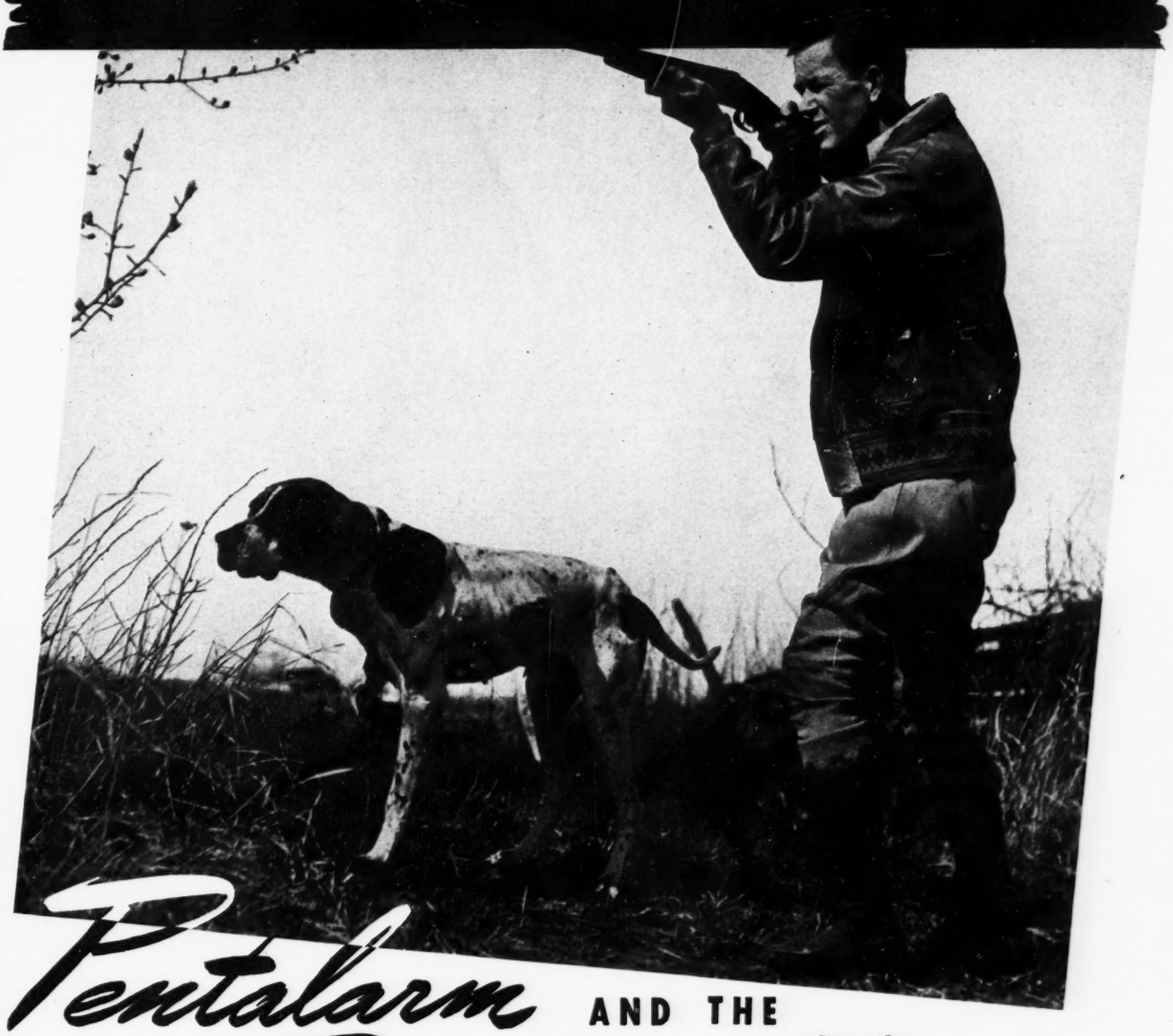

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Bundy Tubing Co. ....

Carbide & Carbon Chemicals Corp. ....
Cast Iron Pipe Research Ass'n Second Cover
The Chaplin-Fulton Manufacturing Co. ....
The Cleveland Trencher Co. 51
Condensation Engineering Corp. 49
Connelly Iron Sponge & Governor Co. ....
The Cooper-Bessemer Corp. ....
Crane Co. ....
Cribben & Sexton Co. 6
Crown Stove Works ....

Dearborn Chemical Co. ....
Detroit-Michigan Stove Co. 39
Dresser Manufacturing Co. ....

Fisher Governor Co. ....
Fraser Furnace Co. 58

General Controls 46
General Gas Light Co. ....
James Graham Manufacturing Co. 45
Greenlee Tool Co. 52
B. F. Grizzle ....

Handbook Butane-Propane Gases, Revised Second Edition 46
Harper-Wyman Co. 41, 42
Hotel Chelsea ....
Howle Co. 49

The Jacobs Wind Electric Co., Inc. 48
Johns-Manville ....

Kitson Co. ....

Lacy Manufacturing Co. 49
Lattimer-Stevens Co. 55

Merco-Nordstrom Valve Co. ....
Milwaukee Gas Specialty Co. 57
Minneapolis-Honeywell Regulator Co. 4
Mueller Co. Third Cover

The National Supply Co. ....
National Tube Co. 5

Pacific Gas & Electric Co. 47
Pacific Gas Radiator Co. 57
Pacific Meter Works 8
Payne Furnace & Supply Co., Inc. 51
Peerless Manufacturing Co. ....
Philgas Division, Phillips Petroleum Co. ....
Pittsburgh Equitable Meter Co. Front Cover

Reliance Regulator Corp. 55
Republic Steel Corp. ....
Reynolds Gas Regulator Co. 53
Robertshaw Thermostat Co. ....
Geo. D. Roper Corp. ....

The W. J. Schoenberger Co. ....
Security Valve Corp. ....
Semet-Solvay Engineering Corp. 56
Servel, Inc., Electrolux Sales Division ....
Sharples Solvents Corp. 1
M. B. Skinner Co. 3
Spencer Thermostat Co. 54
Sprague Meter Co. Fourth Cover

Titan Valve & Manufacturing Co. 50

Union Carbide & Carbon Corp. ....
U. S. Pipe & Foundry Co. 37
United States Steel 5

Ward Heater Co. ....
The Webster Engineering Co. ....
Worthington Pump & Machinery Corp. ....
John Zink Burner Co. 53

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Seventeenth Year of Publication

Contents for January 1941

GUEST EDITORIAL: Individual Vision ..... *By Clark Belden* 7

Thermally Thinking 9

1940 In Review ..... *By Arthur Rohman* 10

TECHNICAL TOPICS

Building a High-Pressure Holder 15

Sizing Meters for Home Heating ..... *By C. A. Peterson* 20

Electrical Bonding for Cathodic Protection of Pipe Lines ..... *By Dr. Scott Ewing* 21

Gas Dispatching on the United Gas System 23

Pipe Line Stream Crossings: Part III ..... *By Robert T. Knapp* 25

A Magnetometer Measures Pipe Line Electric Current ..... *By David Hendrickson* 29

117-Mile Line Augments Columbia System ..... *By E. D. Clutter* 30

Memphis Natural Loops 92-Mile Line Through Mississippi Delta 32

Reforming Natural Gas ..... *By A. M. Rader* 34

OTHER FEATURES

Sales Slants 36

Calendar of Events 44

Industry Personalities 48

Current Reading 54

Modern Products 56

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GAS
JANUARY, 1941

GUEST Editorial

Individual Vision

By CLARK BELDEN

Executive Secretary, The New England Gas Association

A PROMINENT New England gas company executive was attending a meeting of several hundred gas men. A speaker requested those whose important company policies had been placed on paper and studied by department heads to raise their hands. About five hands were held aloft—amidst the curious eyes of the audience. When this man returned home he selected an important company service procedure and made a test. He interviewed separately six different department heads, all of long service and all concerned with the execution of this policy. He asked each man to explain his understanding of the company's policy regarding it. Each man had a different understanding. Not only did the views vary widely, but some of the ideas were contrary to the actual policy.

A couple of years ago a group of gas men were discussing the loss of certain parts of their load during the past 10 years. One man explained the study which he had made of this problem, how he had conducted certain area surveys, how he had instituted revised sales programs to meet certain load losses in these areas and how a definite improvement was already becoming evident. Several of his associates thought his comments most interesting and confessed that they, while aware of similar losses and somewhat troubled by them, had not made any such approach to the problem. One man confessed he had not done much except to talk about it.

A recent sales research conference covering a leading gas appliance clearly showed that many of the 50 sales managers present were not aware of important policies and plans which were being successfully used by certain companies represented, although in some cases such companies were located but a few miles distant.

A questionnaire survey conducted among a group of gas men regarding public relations policies and their execution disclosed a marked weakness in that several of them made assumptions rather than facts the basis of their handling of public relations matters. The questionnaire contained about 20 questions on various phases of public relations procedures but the question which drew the poorest replies of all from the action angle was that which covered customer opinion surveys.

Many of us have sat in committee meetings of gas men, especially the type wherein experiences are being exchanged, and heard the expression: "Well, I never knew you fellows did that. I've been looking for that answer a long time. You're less than a hundred miles from me. Guess I'd better do a little more visiting."

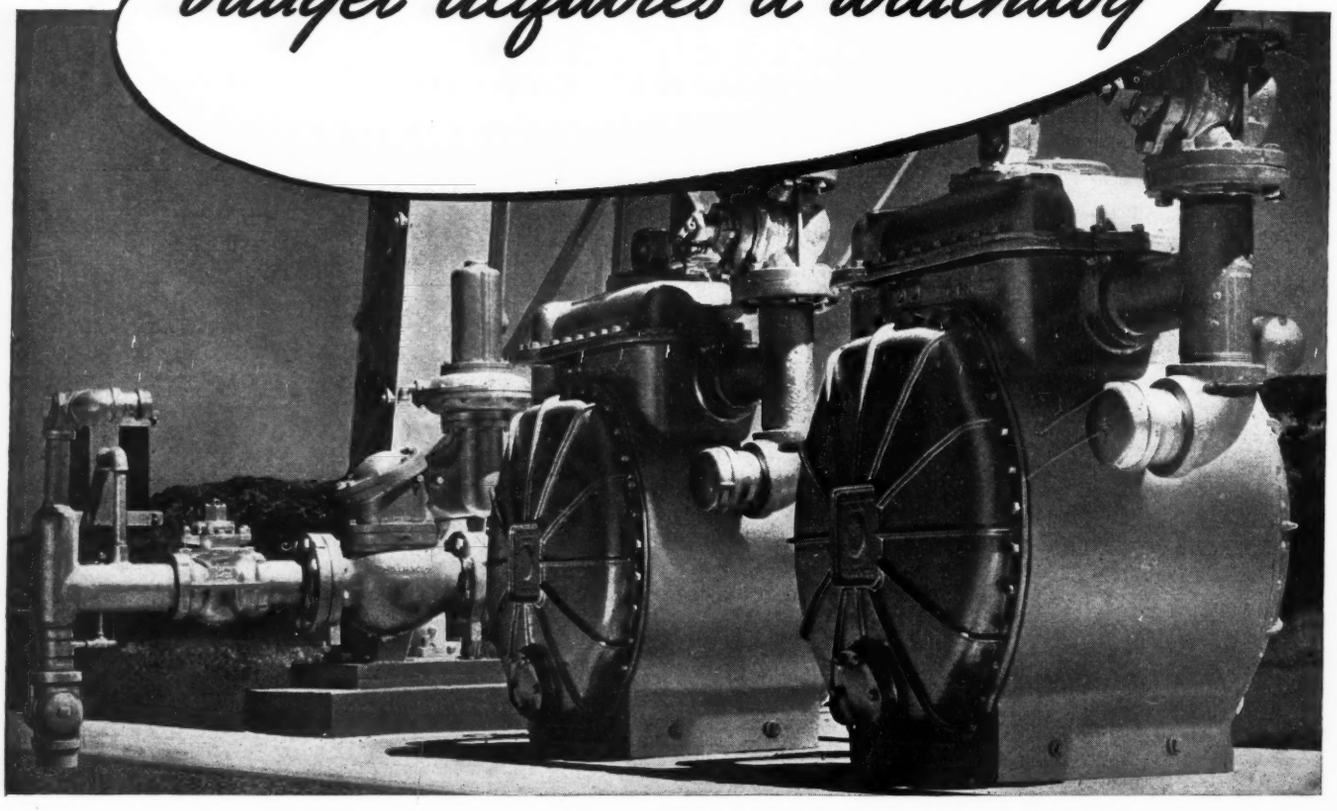
A man whose work is connected with the gas industry and who travels frequently and confers widely with responsible people in the industry has commented that he has concluded that there is much helpful information available throughout the country covering problems and possibilities in many phases of the gas industry—if everybody who could profitably use this information only had it!

So what? The point is this: Why not think of the research aspect of our own daily work in our own respective companies in connection with those matters which we know to be problems, *but also* in connection with other matters which we may think we are now handling reasonably well? And act.

We hear increasingly these days—and most properly so—of industry research and much good work is being done, has been done and doubtless will be done by the national association especially and also by the several regional associations. There is also much good formal company research as such being done. However, there is another type of research which is perhaps a matter of *individual vision*—in the last analysis. Some gas industry men have long displayed such vision and their own daily work has reflected this enterprise.

If there is any plea in this editorial, it is that we give more thought to the research possibilities—informal and non-technical, as well as otherwise—close at home in connection with our own duties. We might call it individual research—by and for ourselves—to help us to do a better job. Perhaps the answers should be more widely distributed among us!

another HOLLYWOOD *budget acquires a watchdog*



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THERMALLY *Thinking*

What Lies Ahead?

AMERICANS all, clustered about their radios on December 26, heard the President, at the request of the citizens, state the course which the United States in the present world crisis must follow. That course is one of action, certain and positive — a course which will, with ever increasing speed, mold this nation into the most powerful human force this world has ever known. It is the earnest hope of everyone that this great force will exert its power for peace. Yet, America, in peace, is at war. "We must discard the notion of business as usual," says the President. "We must be the great arsenal of democracy."

What can this mean to the natural gas industry? In 1940 that industry found itself afflicted with growing pains; its pulsing arteries, the pipe lines, extended themselves 1000 miles in many directions to bring its service to new homes, new industries. And in that year there was conceived in the minds of the industry's leaders one of the most ambitious expansion programs ever attempted — it is the purpose of the industry to tap its bountiful storehouses in Texas and Louisiana, and carry this perfect fuel through 7000 miles of proposed pipe lines to the iron ore deposits of Minnesota, to the industries of Wisconsin, to the states of Pennsylvania, New Jersey, and New York, where lie the greatest concentrations of population and industry in America.

Those who have listened to the industry's leaders, who have read the many articles in the trade and general press, know how important gas, particularly natural gas, is to the national defense program. Let us hope that there will be no delay, no quibbling over the extension of this perfect fuel service to those areas where it can best serve the national welfare.

Caught Kilowatting

ONE of the comforts and solaces of editing rests in the fact that we can always gage how well our product is read by making a slight error in fact, theory, opinion or punctuation.

Let a flawless and letter perfect issue be produced and it is greeted with a silence so profound that the circulation department can hear the unpaid subscribers drop. But let a mistake occur and, as if by magic, pens long unused are picked up, and on paper mellow with age we receive a flood of communications that begin — "In your issue of October, 1940, on page 35 you made the statement that . . ."

In our issue of October, 1940, we *did* make a mistake. Whether it was an editorial inadvertance or a device to test the thoroughness of our readers' study, we do not deem it politic to divulge. But in case you have come across it — or in case you do come across it — you will be comforted to know that you are right; and the statement that you see in cold print is an immortalized error.

Our chagrin is somewhat mollified by the fact that we gave electric cookery considerably more than its due, and still were able to show that it doesn't compete with gas. We trust that this gracious misstatement, if brought to the attention of the electrical industry will create a new birth of conscience, and that their future statements regarding the competitive nature of the kilowatt will be confined to that simple and unobscured honesty that marks the public pronouncements of the gas utilities.

New Product Problems

PREVIEWS of the new models of gas appliances for 1941 again demonstrate the progressive spirit with which the manufacturers of ranges, water heaters, space heaters, and other gas-fired equipment have year after year improved their models in design, in efficiency, in convenience and in safety.

The gas industry as a whole recognizes that this constant improvement and embellishment of utilization equipment has contributed in a great measure to the current and growing conception of gas as the most modern and in every way the most desirable fuel. Shortsighted indeed would be the utility executive who could not see the relationship between his increased domestic sendout and the increased desirability of the appliance designed to burn it.

But with 1941 just beginning, and with the promises that it holds of nothing more certain than its uncertainty, it cannot and should not be reasonably expected that the designing of new models for 1942 will hold the center of attention as they have in years past. Uncertainty as to labor costs will be a big factor, possible shortages in materials that may be comandeered for defense purposes must be taken into consideration. Die makers, pattern and tool makers may all be called away from their established occupations to labor on emergency output more immediately essential to the national welfare.

It has never been the nature of our appliance manufacturers to rest on their laurels. Theirs has always been an unending and spirited endeavor to develop new and better products. But we do not believe they should be subject to any unnecessary demands until they themselves have had the opportunity to orient their position in respect to the entire national defense program. Laboratory requirements promulgated by the American Gas Association, for instance, should not be altered unless there is an obvious and unquestionable reason and demand for such change. Safety requirements should remain the primary consideration, and alterations in design dictated by the demands of safety must always be met. But any other changes should be considered not only in respect to their effect on the production problems of those manufacturers who will have to comply with them.

We believe that right now, here at the start of 1941, the gas industry has at its command the finest array of appliance models for every purpose, and at every legitimate price, that has ever been shown. Unless every sign is false, the consuming public will this year have more purchasing power in its hands than it has had at any time in the past decade. There only remains the requirement that those whose business it is to contact the consuming public make the most of the merchandise that they are privileged to offer — in simple terms, that they *get out and sell.*

1940 IN REVIEW

By ARTHUR ROHMAN
Managing Editor, GAS

TO A great many people the year 1940 must go into history's record as a period of chaos, a time when Destruction ruled with steely ruthlessness, when the works of centuries were blasted to bits in a single night, when human life was as nothing. Yet, underneath this great show of destruction during 1940, there were at work many smaller but potent constructive forces, forces which sought and seek now to replace that which is destroyed today with something better tomorrow. One of these constructive forces is industry, American industry, and an important part of that industry is the gas business. Every day each of us in his own world thinks about that business, seeks some way to make it a better, a more useful, gas business. Much of this thought and action has brought tangible results. Let us examine the industry's record for 1940.

National Defense

Foremost among the Gas Industry activities in this past year has been its resolution to make itself as strong and as efficient as an experienced and intelligent operating personnel can make it so that it may serve this country in every way necessary against any eventualities that may develop. In the words of the late A. B. Groesbeck it is "Our Opportunity to Serve."

> "It is worth remembering that the United States needs and will need dependable fuel service more in the coming months and years of high-speed preparedness production than perhaps ever before in history. Only we who are skilled and experienced in this business can adequately render such service. It is the responsibility of the gas industry, through its skill and resources, to keep the great facilities of the industry geared to the requirements of the national emergency defense program."

First practical step for national defense was taken in June of 1940 when the Executive Board of the American Gas Association placed its services and its support at the disposal of those departments of the government concerned with national defense, and outlined a four-point program whereby the gas industry would lay plans to provide uninterrupted service in any emergency; to develop protective measures for gas industry properties; to cooperate in the production of war munitions; to offer the services of its personnel, particularly those men with experience gained in participation in the first World War.

At this same time A.G.A. President Walter C. Beckjord appointed from the Association's membership a new Committee on National Defense, headed by George F. Mitchell, president of the Peoples Gas Light and Coke Co., Chicago.

To enumerate the countless ways in which the gas industry is aiding the national defense would require volumes. Suffice it to say that the gas industry is taking a leading part in supplying the vast industrial heating needs of factories and mills that are producing the thousands of parts for equipment and machines necessary in the National Defense program. For hardening the small and intricate parts of machine guns to the final heat treatment of the largest guns, specially designed gas furnaces are speeding production at an ever increasing pace. In the navy yards, some of the largest industrial furnaces ever built are annealing fully assembled gun turrets with gas. Equipment which has been developed for peace-time uses during the last decade through cooperative research and engineering by the gas utilities and leading equipment manufacturers under the sponsorship of the American Gas Association is rapidly being put to work to speed up production in war industries.

During the past two years the Canadians have realized fully the importance of gas in the world of chemistry. To quote from *Saturday Night*, published in Toronto, Canada.

> "The men to whom synthetic chemistry is an exact science know more about gas this time. In the last war a single gas company in England provided enough high expplosives to fill 160 million eighteen pounder shells, 17 million gallons of tar, 29 million pounds of disinfectants in the last war and enough road tar to treat all the military roads on the western front. And this time the capacity of English and Canadian gasworks is increased by just half. Britain has a gas industry twice as large as Germany's."

In the United States production of helium from natural gas reached an 11-year total of 100 million cu. ft. at the world's only plant, operated by the U. S. Bureau of Mines at Amarillo, Texas. This plant is prepared to meet any demands probable for helium for the U. S. Army or Navy in the national defense program. This production is less than 50% of the potential output for an equal period, if the plant were run at its maximum rate of capacity.

Facts and Figures

In continuation of the upward trend which began in 1939 after a temporary setback in 1938, the gas companies of America, supplying towns and cities with a combined population of 84 millions, served a total of 17,980,300 customers in 1940, according to year-end figures released by the American Gas Association. An increase of 481,000 over the year 1939, this was the largest number of consumers ever served by the gas industry.

Of the 1940 total, 10,232,900 used manufactured gas, and the remaining 7,747,400 used natural gas. Revenues for the entire industry, both manufactured and natural, aggregated $873,358,000. This was a 7.3% gain over the 1939 figures. In 1940 natural gas companies grossed $491,276,000, for a gain of 9.4%, while revenues of the manufactured gas companies grossed $382,082,000 for a gain of 4.6%.

Increases in the sale of natural gas for domestic uses was particularly good. Sales rose from 372,971,000,000 cu. ft. in 1939, to 419,354,000,000 cu. ft. in 1940, for a gain of 12.4%. Manufactured gas for the same purposes gained 7.3% for the year. Sale of natural gas for industrial purposes also showed an increase, rising from 654,662,000,000 cu. ft. in 1939, to 719,776,000,000 cu. ft. in 1940, a gain of 9.9%. The sale of manufactured gas for industrial and commercial purposes likewise improved with an increase of 7.7%.

Of the total production of 2,600,000,000,000 cu. ft. of natural gas in 1940, approximately 183 billion cu. ft. were used in generating electric power.

It is of interest to note that industry and business used about 55% more gas during 1940 than during the boom period of 1929. It is also estimated that the normal use of industrial and commercial gas during 1941 will be at least 10% greater than in 1940.

Technical Topics

As a growing and progressive service to the American People, the Gas Industry has each year recorded no-

table achievements in its operating methods — in its task of taking the raw materials from the earth and bringing it to the ultimate consumer. The year 1940 was no exception.

Most significant of the technical advances made in this past year was the evolution and erection of a plant for the liquefaction of natural gas by the East Ohio Gas Co. of Cleveland. This plant, consisting of liquefaction apparatus and three 57-ft. spherical tanks, will store 250,000 cu. ft. of liquid gas, which upon regasification will provide a standby gas supply of 150,000,000 cu. ft. of gas. This pioneer step in providing standby service may solve many another gas utility's peak load problem, has attracted keen interest both within and outside the industry.

In the field of gas transmission and distribution, Raymond Hadley of the Susquehanna Pipe Line Co. of Philadelphia attracted industry-wide recognition and earned the American Gas Association's Beal Medal for his presentation of historical background and test data on microbiological Anaerobic corrosion, his data revealing that such corrosion exists in the United States to a degree where it cannot be overlooked by corrosion engineers.

A new development of 1940 was the introduction of X-ray photography as a means of making non-destructive examinations of welds and corroded areas in installed pipe lines. R. Richardson of Osborn and Nelson and W. M. Henderson of Southern California Gas Co. have described existing equipment and field tests.

Of value to the industry was a review by the Bureau of Standards of the various methods for estimating the corrosivity of soils, particularly as each method has had numerous proponents, resulting in some confusion.

A contribution in the field of distribution practice was the development of a method of leak location through the examination of vegetation. This system is not only a new approach to leakage survey work, but offers also opportunity toward civic cooperation in preserving shade trees.

Great interest in the underground storage of gas was evident from the enthusiasm created by the symposium of papers delivered at the Natural Gas Section Meeting in Houston last May. Now a well recognized and widely accepted practice, underground storage during the past year has forged ahead in its technical and economic aspects in the light of actual experience.

In the dehydration of gas pipe lines Henry N. Wade of Los Angeles has brought to light new technique of combined dehydration and sulfur removal and combined dehydration and gasoline extraction. As a related activity, W. M. Deaton and E. M. Frost, Jr. of the U. S. Bureau of Mines developed new and authentic data permitting a more dependable and comprehensive study of the problem of gas hydrates.

Looking at the subject of pipe line stream crossings from the hydraulic rather than the construction engineer's point of view, Professor Robert T. Knapp of California Institute of Technology devoted his series of three articles (see Page 25) to the study of the vagaries of alluvial streams.

During the past year the status of radio communication as used for gas dispatching and emergency work was reviewed. Of great interest to pipe line operators was the advanced technique employed by Natural Gas Pipe Line Co. of America in operating its extensive transmission system. Revealed also were the present more liberal government regulations, and the conditions and procedure for obtaining a Federal license.

One of the most pressing problems confronting the gas industry is that of the conservation of natural gas. One of the most significant developments toward the solution of this problem was the formation of the American Recycling Association at the Texas College of Arts and Industries at Kingsville, Texas. The Association held a two-day short course in November dealing with recycling, repressuring, and retrograde condensation and, according to R. L. Peurifoy of the Texas A and I, the program is expected to become an annual affair.

Great strides have been made in oil well drilling during the past few years, particularly in the drilling and bringing in of deep oil and gas wells. Figures show that well drilling costs have been reduced extensively in the past 10 years. Today a 6000-ft. well is sunk in 12 days at costs averaging between $3.00 and $4.00 a foot. This compares with a 30-day drilling period for a 3000-ft. well at a cost of $8.00 per foot 10 years ago.

Turning to the topic of gas utilization we find that a much needed and greatly welcomed contribution was that of A. F. Rice, who examined completely and practically that somewhat neglected appliance, the gas floor furnace, which is now coming into wide and diversified use.

R. M. Conner, director of the A.G.A. Testing Laboratories, presented valuable new data on appliance operation as affected by variation in composition of gases burned, thus giving supplementary and extended information on the subject of the interchangeability of gases in utilization practice.

During the year summer air conditioning, an increasingly important load, progressed to the point where definite factual data became available, enabling more accurate estimates of operation and dependable designs of installations. Also, great progress was made in adapting gas to many and varied industrial applications.

In the matter of food preparation, the industry extended its development of new gas equipment for restaurants, hotels, clubs and bakeries that was begun in 1939. Food preparation technique is changing rapidly, and chefs are finding that the newly designed gas equipment enables them to adopt the newer cooking methods. Out of the experimental laboratories have come special appliances, such as deep fat fryers, thermostatically controlled grills, individual deck baking and roasting ovens, radiant ceramic broilers, and various types of coffee makers, to relieve the gas range of special cooking functions. This movement toward specialized gas appliances to provide speed and quality in quantity cooking is expected to accelerate rapidly during 1941.

Fundamental Research

One of the most significant trends of this past year was the growing recognition of the need for fundamental research. A leader in the movement to foster fundamental research in the gas industry has been Frank C. Smith, president of Houston Natural Gas Co.

A further step towards the actual realization of an institute of gas technology was made at the annual convention in October when Westbrook Steel, executive director of the Institute of Paper Chemistry, made his recommendations for the creation of an institute of gas technology.

In line with this movement towards fundamental gas research one of the most interesting events of the past year was the display of the United States Bureau of Mines at Bartlesville, Okla., of hundreds of products that can be derived either directly or indirectly from natural gas. Among these were women's silk stockings, bathing suits, fishing leaders, surgical sutures, tooth brush bristles, printing plates, synthetic rubber products, lubricants, and edible fats.

Another event of importance to the industry was the formation of the Idaho Carbon Chemical and Rubber Co., organized jointly by Phillips Petroleum Co. and the B. F. Goodrich

Co. to manufacture a new synthetic rubber. In this new process 50 to 100% of the natural rubber is replaced by a new synthetic, Ameripol, a copolymer of butadiene from petroleum gases and other materials obtained from natural gas and air.

Pipe Line Projects

In the construction of natural gas pipe lines, both completed and proposed, 1940 was an important year. More than 1000 miles of major transmission lines were completed, another 700 miles started, and more than 7000 miles proposed. The extent of the construction was impressive in the mileage involved, in the total expenditure, and in the size of the population of the affected areas.

The New York state district was the center of much activity, some actual and some proposed. The Manufacturers Light and Heat Co., Manufacturer's Gas Co., and Pennsylvania Fuel Supply Co., all of Pittsburgh, and all affiliated interests of Columbia Gas and Electric Corp., of New York, completed a second 100-mile steel pipe line for natural gas transmission at a cost of $1,800,000. (See Page 30.)

The most ambitious project proposed the past year also had the New York area as the objective. The Reserve Gas Pipe Line Co., of Dallas, Texas, filed with the Federal Power Commission an application for a certificate of public convenience and necessity authorizing the construction and operation of a natural gas pipe line system extending 1500 miles from Texas into the state of New York. The natural gas, under this proposal, would be sold at wholesale to distributing companies serving markets in the New York City, New Jersey, and Philadelphia districts. The estimated cost of the line is about $80,000,000, and it is planned as a 24-in. main transmission line operating at approximately 1000 lbs. per sq. in. pressure.

The heart of the middle west also witnessed considerable expansion in natural gas facilities, with the Panhandle Eastern Pipe Line Co. continuing the loop line program which was begun in 1936. Their first project this past year was a $3,500,000 job involving the installation of 137 miles of loops along the company's line that carries natural gas from the Texas Panhandle and Hugoton, Kan., gas fields to the Illinois-Indiana state line, where it is turned into the system of the Michigan Gas Transmission Corporation and delivered to Detroit.

The second project was the construction of another 106.5 miles of 24-in. and 20-in. loop lines along the line from the Texas Panhandle to the Illinois-Indiana state line. This construction enables Panhandle Eastern to increase its delivery capacity from 25 to 30 million cu. ft. per day. It was necessitated by the growing demands of the Michigan Consolidated Gas Co. of Detroit and cities and towns in Kansas, Missouri, and Illinois. Additional compressor capacity was also added at various points.

The Northern Natural Gas Co. of Omaha, Nebraska, was also active in laying new lines to serve the mid-continent area. One new project involved additions to its system consisting of 243 miles of 16-in. main line, 125 miles of 2-, 3-, 4-, and 6-in. branch lines to serve 19 different communities, a pipe line suspension bridge over the Missouri River, and two compressor stations, one of 1600 hp. and the other of 1300 hp.

A further expansion by Northern Natural included the laying of approximately 62 miles of loop lines, 32 miles of new transmission lines, five branch lines, and the installation of compressor units totaling 5600 h.p. The loop lines were 24-in., and the main transmission lines consisted of 9.5 miles of 12-in. line, and 22.5 miles of 10-in. lines.

In the upper Illinois district, the Natural Gas Pipe Line Company of America completed more than half the construction on a 165-mile pipe line extension that tapped the main Texas Panhandle to Chicago line at Geneseo, Ill., and which is eventually expected to reach the industrial section of southern Wisconsin near Milwaukee.

In the fore-front of proposed construction in the middle west is the line contemplated to extend from the Panhandle district to Milwaukee. Two companies are engaged in hearings before the F. P. C. on this line. The Independent Natural Gas Co. has proposed to build an 877-mile line to cost approximately $28,698,000, and the Western Natural Gas Co. has proposed to build a 770-mile line, at a cost of approximately 30 million dollars. Although taking slightly different routes, the general area to be traversed is the same for both lines.

The longest, although not the most expensive, proposed line was that of the Kansas Pipe Line and Gas Co., which contemplates a 2300-mile line extending from Kansas to Minnesota. The cost is estimated at $14,550,000, of which $10,000,000 would be spent for main lines, $1,800,000 for branch lines, and the balance for five compressor stations and other items, such as crossings, pipe protection, and a dehydrating plant. The line is scheduled to serve 102 towns with a total population of 275,650.

In the South, the Louisiana-Nevada Transit Co. completed 100 miles of 8-in. pipe line to transport approximately 20 million cu. ft. of natural gas per day from the Cotton Valley Field of Webster Parish, La., to the and Hope, Ark., territory.

On November 20, The Southern Natural Gas Co., Birmingham, Ala., began construction of a pipe line from Rome, Ga., to serve the distributing utility, the Chattanooga (Tenn.) Gas Co. Recently the Tennessee Gas and Transmission Co. was given more time by the Federal Power Commission to present its plans for the building of a new $20,500,000, 800-mile line from Louisiana to serve middle and eastern Tennessee and western North Carolina.

The Northwest was also the scene of extensive activity when the Montana-Dakota Utilities Co., Minneapolis, Minn., constructed 147½ miles of additional main and branch pipe lines. The line originated at Fort Peck, Mont., and extended to a point near Glendive, Mont. It was intended primarily to serve as an outlet for gas from Bowdoin, near Glasgow, Mont.

Although the far West did not engage in any major transmission line construction, the Pacific Gas & Electric Co., San Francisco, engaged in the development of new sources of supply. Three fields which have been showing considerable promise were brought into the system by the laying of field gathering lines, and natural gas was brought to several new towns.

The Sales Front

The gas industry with increasing activity on the sales front made great forward strides in 1940. A survey conducted near the close of the year revealed that the attitude of American housewives toward gas fuel and the modern gas range has undergone a marked improvement over the last five years during which the industry has sponsored a national advertising program.

During the past year, full-page advertisements on the modern gas range and on the four main household uses of gas fuel have appeared in national magazines with a circulation of nearly 20,000,000. In addition, 16 magazines serving the trade and professional fields have carried advertising promoting the industrial use of gas.

Augmented by local newspaper advertising, the national campaign has been an influential factor in increasing sales of gas and modern gas-using equipment.

Gas companies continued to inaugu-

rate more favorable rates for house-heating through central plant burners and equipment. It is estimated that the total number of gas central house-heating installations connected to the lines of all United States gas companies in 1940 amounted to 800,000. In addition there were approximately 1,800,000 dwellings heated by unit heaters, space heaters, floor furnaces, etc., giving a total of more than 2,600,000 homes in the United States that are heated by gas. During the year gas range sales totalled 1,600,000 units; automatic gas water heaters, 500,000.

Of the 292 U. S. Housing Authority Projects contemplated in 1940, 225 have decided the cooking fuel, 179 of these choosing gas; water heating has been decided in 150 projects, 82 specifying gas; gas has won 140 out of 179 decisions for laundry service; gas space heating will be installed in 87 out of 166 projects; gas refrigeration took 33 out of 171 decisions.

The Commercial Section

During the year the 12 major A.G.A. Commercial Section Committees, under the direction of their respective chairmen and of Commercial Section Chairman Davis M. DeBard, held their meetings on schedule.

The Domestic Range committee was increasingly active. Nearly 7000 gas company and dealer salesmen were registered in the CP Ranger Club during the year and keen competition and rivalry has featured the contest for the gas company salesmen and dealer awards. A unique activity of this committee was the introduction of an Audio-Training service for salesmen. Through this, the salesman's presentation is recorded, played back, and he hears his own presentation from the customer's viewpoint.

Among the many accomplishments of the Home Service committee was special consideration of CP Range promotion. The cooking survey, with returns from companies representing six million meters was followed by a second Interim Bulletin on "Aids in the Promotion of the CP Range." A standard time and temperature chart has been completed, and the CP Range Cook Book has been revised to include this material. Interim Bulletins entitled "Points and Paragraphs on Gas Refrigeration" and "Points and Paragraphs on Automatic Water Heating" have been completed, and plans and outlines for consumer booklets have been made.

As a result of the meetings held by the House Heating and Winter Air Conditioning committee and its subcommittees, reports on the "CQ" Heating Program have been forwarded to the Industry. The Housing and Realty Projects committee materially assisted member gas utility companies during the past year in their effort to secure the use of gas and gas services in local U.S.H.A. Housing Developments.

Included in the work of the committee on Improving Domestic Gas Appliances for the past year was the consideration of a proposed CP Water Heating Program. A questionnaire on this subject has been sent to a group of gas companies.

More than 12,189,000 meters were represented by 484 companies whose 3600 salesmen registered in the national Refrigeration Sales Program, the "Life Begins in '40 for Gas Refrigeration" campaign.

In addition to the regular work and routine, the Section undertook several unique promotional endeavors during 1940. Most important in the cause of gas cooking, was the inauguration of an International Cooking School featuring the personal appearance of George Rector.

Through the Home Appliance Planning Bureau, gas and gas appliances were promoted in the new home field. A survey conducted by the Bureau among member gas companies in which 130,000 new homes were reported, which is more than one-half of the homes constructed in 1939 in territories served by gas, indicated 90.8% using gas cooking, 12.1% for gas refrigeration, 77.4% for water heating and 61.8% for house heating.

Of major importance in the promotion of gas and gas appliances was the industry's participation in the nation's two great expositions, the New York World's Fair and the Golden Gate International Exposition. Said N. T. Sellman, Publicity Committee chairman for Gas Exhibits, Inc., "Our participation in the World's Fair provided a vehicle for wide localized and national publicity and promotion. . . . We united our industry . . . in behalf of a common, far-reaching promotional endeavor." And now that the Fairs have ended, steps have been taken to perpetuate and enlarge the promotional gains made through expositions. This work will be done by The Pavilionaires, Inc., of which S. B. Finch, Brooklyn Union Gas Co., is secretary-treasurer.

A.G.A. Activities

Last year, as in the many years past, the American Gas Association, through its many leaders and its active committees, contribued greatly toward the progress of the industry. As evidence of its alertness, it is interesting to note several changes in its operating set-up, these being designed to more sharply define the activities of certain groups.

The constitution of the Association has been amended, changing the names of the Commercial and Industrial Gas Sections. The Commercial Section has become the Residential Section; the Industrial Section, the Industrial and Commercial Section.

The early part of the year saw the organization of a new Industrial Gas Section committee, the General Sales Committee. H. Carl Wolf, president of the Atlanta Gas Light Co., was named chairman of this committee. Another Industrial Gas Section change concerned the growing importance of air conditioning; the Industrial and Commercial Air Conditioning committee became the Joint Committee on Summer Air Conditioning of the Industrial and Commercial (Residential) Sections.

Association Organized

As a further evidence of organization and expansion in the gas industry, the past year saw the formation of one additional regional gas association. This was the Mid-South Eastern Gas Association, which was organized at the University of North Carolina, at Rawley, N. C.

Several years ago the A.G.A. organized a membership committee. Last year over 500 new members became affiliated with the Association through the efforts of this committee.

To review completely the many ramifications of the work of the American Gas Association would require volumes, yet, speaking all too generally, it must be stated that throughout the year great progress was made and all credit is due to F. B. Flahive of Columbia Gas and Electric Corp., chairman of the Accounting Section; to Davis M. DeBard, Stone & Webster Service Corp,. chairman of the Commercial Section; to F. T. Rainey, of The Ohio Fuel Gas Co., chairman of the Industrial Section; to E. F. Schmidt of the Lone Star Gas Co., chairman of the Natural Gas Section; to Fred M. Goodwin (retired), chairman of the Technical Section; and to Frank H. Adams, president of the Association of Gas Appliances and Equipment Manufacturers.

During the past year the American Gas Association Testing Laboratories have been exceptionally active, according to a report from N. T. Sellman, Consolidated Edison Co. of New York and chairman of the Laboratories' Managing Committee.

Testing of gas appliances by the Laboratories increased nearly 20% in the past year. Over 3000 models were tested at Cleveland and Los Angeles, supplemented by more than 1300 inspection visits. Over 17,000 separate and distinct models are now included in their latest Directory, representing the products of 423 manufacturers. Display of the trade-marked Laboratories' Approval Seal by more than 95% of appliances now offered for sale testify to its wide customer-acceptance.

For the last two years, the Laboratories have served as the official testing agency for examination of gas ranges for compliance with Certified Performance requirements. These specify A.G.A. approval as a prerequisite, but also stipulate additional constructional and performance features. The products of 22 gas range manufacturehs now meet these requirements and may be licensed to display the widely-advertised CP trade-mark.

One of the most important events in the Laboratories' history was the opening in February of the new Pacific Coast Branch in Los Angeles.

In the early part of the year the American Gas Association published "Fuel-Flue Gases; The Application and Interpretation of Gas Analyses and Tests." This volume was prepared by a sub-committee of a chemical committee of the technical section, with Lewis Shnidman, Rochester Gas and Electric Corp., as chairman. C. George Segeler, utilities engineer of the American Gas Association, was editor.

Personalities

During the year just concluded the following Gas Industry leaders were awarded unusual recognition for outstanding accomplishment, were elevated to higher office, took over greater responsibilities.

B. C. Adams, elected president and general manager of the Gas Service Co., and president of the Kansas City Gas Co. and the Wyandotte County Gas Co.

William W. Bodine, elected president, United Gas Improvement Co., Philadelphia, Pa.; had been vice president (1925), executive vice president (1934).

Edward M. Borger, elected president of The Peoples Natural Gas Co., had been since 1935 general counsel for that company, the Hope Natural Gas Co., New York State Natural Gas Corp.

R. M. Conner, honored at a surprise banquet May 3, 1940 for completion of 15 years service as director of A.G.A. Testing Laboratories.

C. E. Gallagher, elected chairman of the board of the East Ohio Gas Co., Cleveland, Ohio, affiliated with the company since June, 1899; Mr. Gallagher, one time assistant general manager, in 1933 became president.

T. H. Hall, awarded the Distinguished Service Cross of the World War, is now manager of Southern California and Arizona districts, George D. Roper Corp.

D. A. Hulcy, elected president of Lone Star Gas Co., Dallas; also elected chairman of the board of the Texas Cities and Community Natural Gas Companies; has been with the company since 1916.

W. Alton Jones, elected president of Cities Service Co. of New York to succeed the late Henry L. Doherty; began his career with the company in 1912 as a cashier; became vice president in 1927.

A. Gordon King, appointed secretary of the Technical Section of the American Gas Association; joined the staff in 1923 after wide experience in England and Canada, serving in the Chemical Warfare Section of the U. S. Army.

C. N. Lauer, president of the Philadelphia (Pa.) Gas Works Co., was conferred the honorary degree of Doctor of Laws by the University of Pennsylvania; a past president of the American Gas Association, 1939.

A. D. MacLean, elected vice president of the Pittsburgh Equitable Meter Co.

C. O. G. Miller, elected chairman of the board of the Pacific Lighting Corp., San Francisco, Calif., held the position of president for 42 years; is one of the founders of the Corporation.

R. W. Miller, elected president of Pacific Lighting Corp., San Francisco, Calif.; had been an officer of the company since 1924, executive vice president since 1929.

D. S. Reynolds, chief engineer of the Boston Consolidated Gas Co., made vice president in charge of engineering, manufacturing and construction; came to the United States at the age of 17 from England; started in the gas industry in 1929.

J. F. Robinson, resigned as president of The Peoples Natural Gas Co., Pittsburgh, Pa.. to accept the presidency of the East Ohio Gas Co., Cleveland, Ohio.

Justin R. Whiting, named to succeed Wendell L. Wilkie as president of the Commonwealth and Southern Corp.; also named to the board of directors.

John E. Zimmerman, elected chairman of the board and senior executive officer of United Gas Improvement Co., Philadelphia, Pa.

Obituary

Death in the year 1940 claimed the following gas industry leaders:

C. B. Babcock, on January 7 at St. Mary's Hospital, San Francisco; 56 years of age; was president of the C. B. Babcock Co., representative on the Pacific Coast for eastern appliance factories; pioneer in gas heating, being one of the first manufacturers of gas furnaces in the west; founder of the C. B. Babcock Co. in San Francisco in 1911; president of Pacific Coast Gas Association, 1917.

Denis Alexander Coste, 79, in Chatham, Ont., founder of the natural gas industry in Canada; director and first vice president of the Volcanic Oil & Gas Co.

George B. Cortelyou, on Oct. 23 at his home, Huntington, Long Island, at the age of 78; retired president of the Consolidated Gas Co. of New York; joined the company in 1909 as president and trustee, after retiring as secretary of the treasury in the cabinet of President Theodore Roosevelt.

L. B. Denning, at the age of 65 at Dallas, February 6; one of the founders and president of the Lone Star Gas Co., Dallas; began the organization of this company in 1909 with E. R. Brown.

H. L. Doherty, at the age of 69, on December 26, 1939, from pneumonia; president of Cities Service Gas Co, New York; began as an office boy at the age of 13 working up to assistant manager; in 1905 formed Henry L. Doherty & Co. which in 1910 became a separate holding company, the Cities Service Co.; first man to outline a definite plan to prevent the waste of petroleum due to excessive drilling.

A. B. Groesbeck, on November 30 at Locust Valley, Long Island; was vice president and general manager, United Gas Corp., Houston, Texas.

Charles G. Groff, October 24; chairman of the board of directors of Servel, Inc., and president and chairman of the board of directors of the Electrolux Corp.

E. R. Guyer, at the age of 48 on March 18 due to injuries sustained in a fall; was first vice president of Cribben & Sexton Co. and immediate past president of the Association of Gas Appliance and Equipment Manufacturers.

George Hammer, on June 13; president of the Hammer-Bray Co.; served as director of the Pacific Coast Gas Association and as chairman of the Gas Range Division of the Association's Manufacturers Section.

Hugh W. Hartman, on June 8 of a heart attack at the age of 53; was assistant manager of the American Gas Association and secretary of the Association's Accounting and Technical Sections; was the oldest member of the Association's headquarters staff.

A. H. Markwart, on January 25; was vice president in charge of engineering for the Pacific Gas and Electric Co., San Francisco, which position he held since 1922.

Robert Mueller, on March 27 at the age of 67; was vice president in charge of public relations of the Mueller Corp.

G. W. Olmsted, on January 15, at the age of 65; was vice president and director of the Long Island Lighting Co., New York; was one of the founders of the Long Island lighting System; at the time of his death was also president of the United Gas & Electric Corp.; vice president of Kings County Lighting Co.

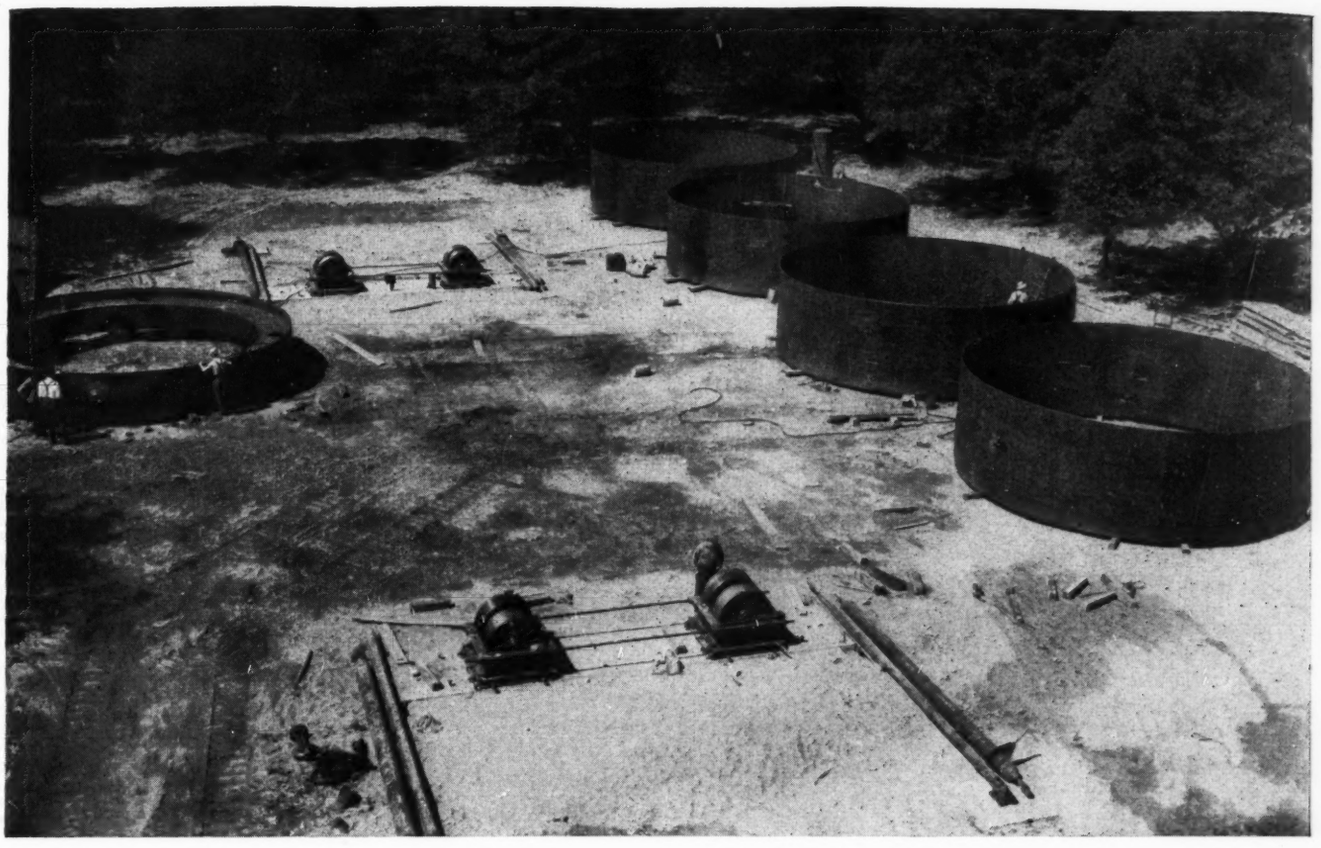
W. S. Ralston, on July 6 at the age of 70; was president of the Chaplin-Fulton Manufacturing Co. which was founded by his father; was the inventor of pressure regulators and regulator improvements.

Paul A. Ryan, on December 25 in his home in New York; since 1927 chief statistician and head of the statistical staff of the American Gas Association.

J. B. Tonkin, on January 26 at the age of 64; was a retired president of the Peoples Natural Gas Co., Pittsburgh, Pa., and affiliated companies; was an active member of the A.G.A. and was a director and past president of the Pennsylvania Natural Gas Men's Association.

Edward C. Uhlig, in September at the age of 72; was formerly chief chemist of the Brooklyn Union Gas Co., Brooklyn, N. Y.

John M. Wilson, at the age of 64; was chairman of the board of National Supply Co., Pittsburgh, Pa.; first joined the sales staff of the National Supply Co. at Beaumont, Texas. His father was one of the company's founders and presidents.



1. **The Holder site,** situated in a grove of walnut trees, showing the workmen assembling one of the ring girders (left) and some of the riveted sections (right). The two pairs of rollers, resting on concrete foundations, are seen in the center foreground of the picture.

Building a High-pressure Holder

THE December, 1939, issue of *G A S* told the story of an interesting high pressure gas storage holder construction job in Southern Counties Gas Co.'s (California) Santa Monica Bay district, where certain radical departures from past practices in the construction of large pressure vessels were being tried out. The series of eight holders, which were under construction at that time, are completed and in service; and the methods employed in their erection have proved successful.

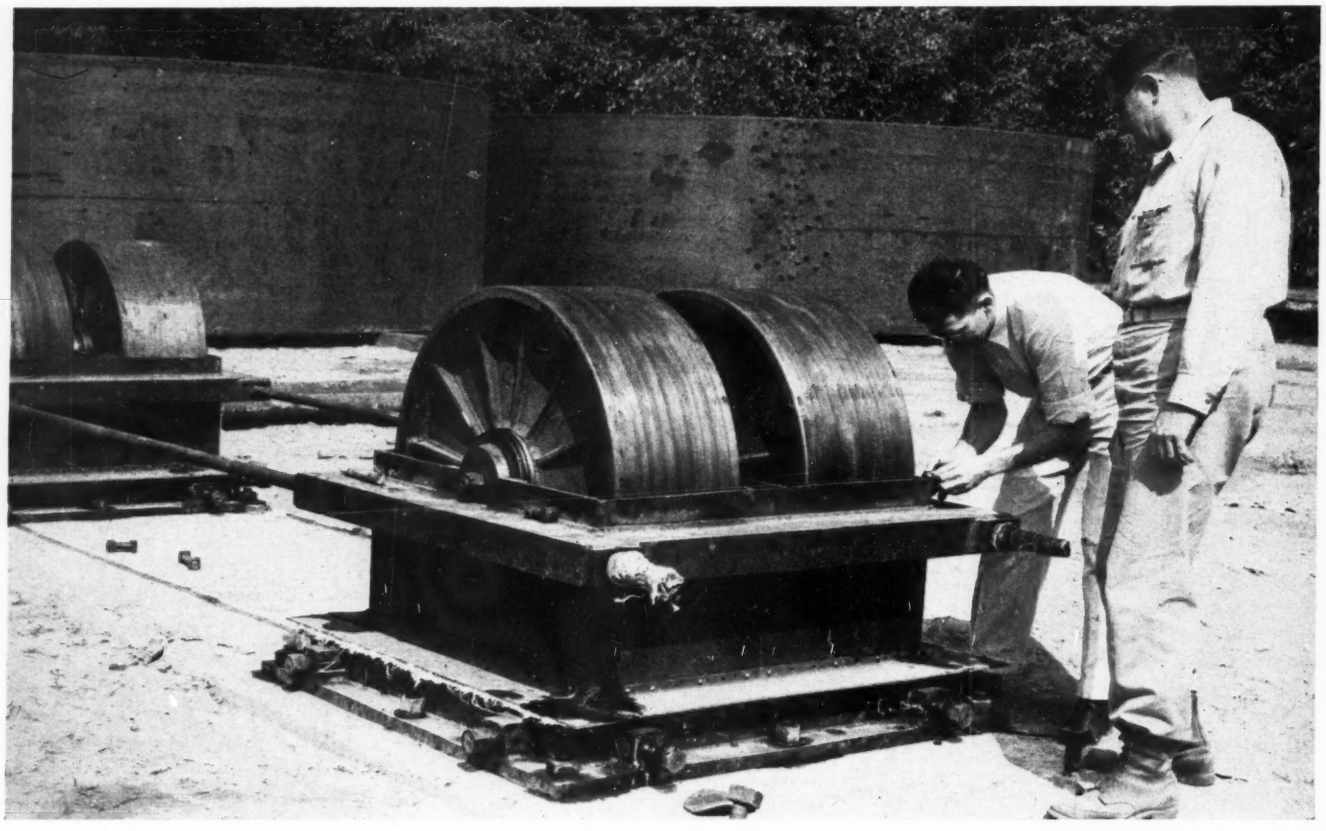
Now, however, on a new holder construction job at El Monte in Southern Counties' Monrovia district, the previous experience has suggested several refinements in these methods. On the Santa Monica job two ring girders were placed around the outside of each shell after it was completed. Principal innovation on the present job is the employment of these ring girders, placed inside the shell, to support it during construction, eliminating the radial spokes used on the previous job.

The sections of the shell containing the ring girders are first set on pairs of rollers mounted on adjustable bases which in turn rest on the permanent foundations. The shell sections containing the ring girders are supported in a vertical position by adjustable diagonal braces. Then sections of the shell consisting of completely fabricated rings of plates are added successively on alternate sides to these ring girders.

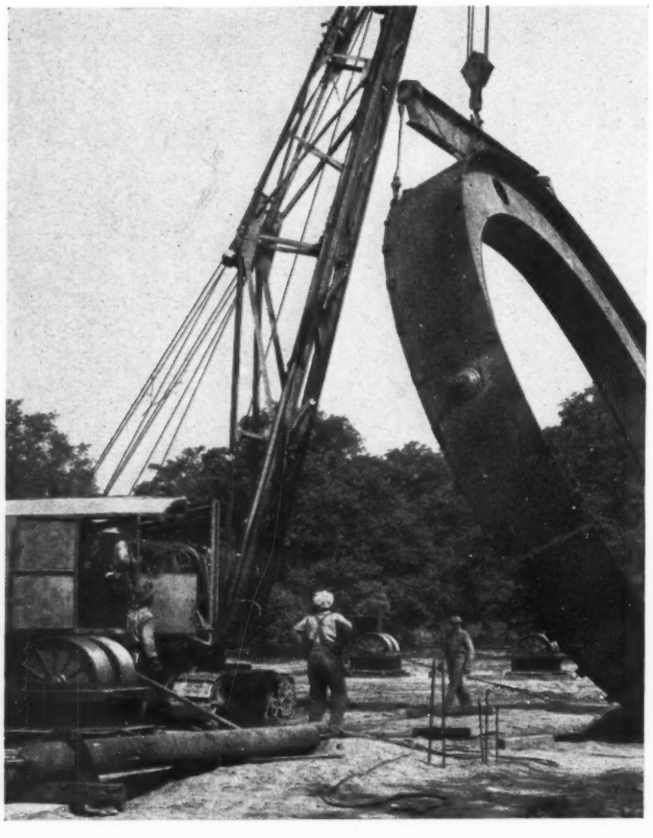
Erection of the shell proceeds until each half, cantilevering out in both directions from its ring girder, is complete. When these two halves have been completely assembled, they are lined up and brought into position by adjustment of the roller bases and the diagonal braces. The two completed sections are then clamped together and the diagonal braces removed. The entire shell may now be rotated while the round-about seams are welded.

This method of erection eliminates the large number of rollers mounted on hydraulic jacks used to support the individual rings of plates which made up the cylindrical shells of the holders on the Santa Monica job. It also eliminates the radial spokes in each ring section which were used in the erection of the Santa Monica holders to prevent deformation of the individual rings while they were being assembled. A third advantage of this method of erection is the ease with which this heavy shell can be rotated on the carefully constructed large rollers.

As in the Santa Monica job, the new methods are a development of W. A. Sandberg, engineer for the Lacy Manufacturing Co., which is doing the work. The photographs reproduced here, taken by Jim Leonard of Southern Counties Gas Co., show the holder in various stages of construction. It is suggested that the reader go to the previous article, which appeared on page 24 of *G A S* for December, 1939, for a comparison of the new methods with those employed on the earlier job.

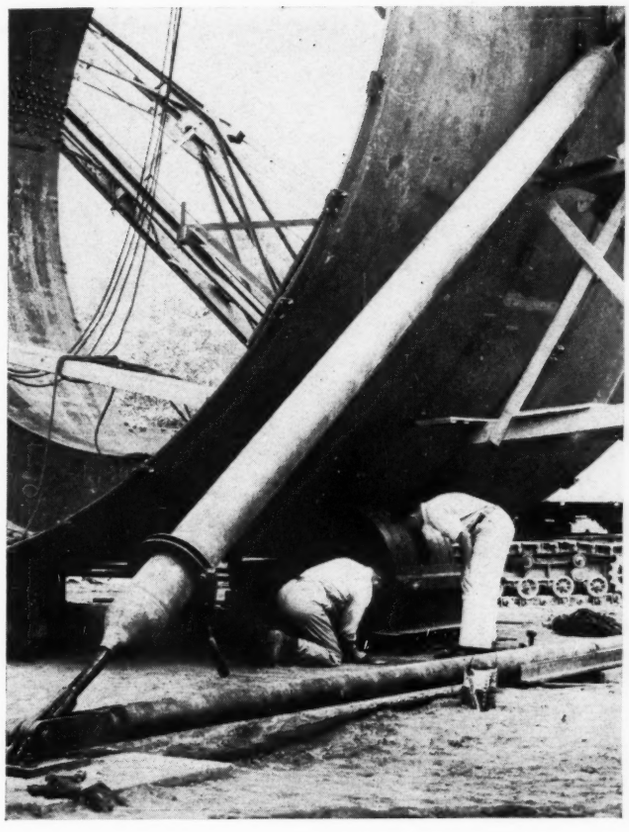


2. **A pair** of rollers being aligned by Lacy company engineers. The rollers rest on an adustable base, and each pair is fastened together by bars, so that when their position is finally adjusted for alignment, they will move together as one single unit.

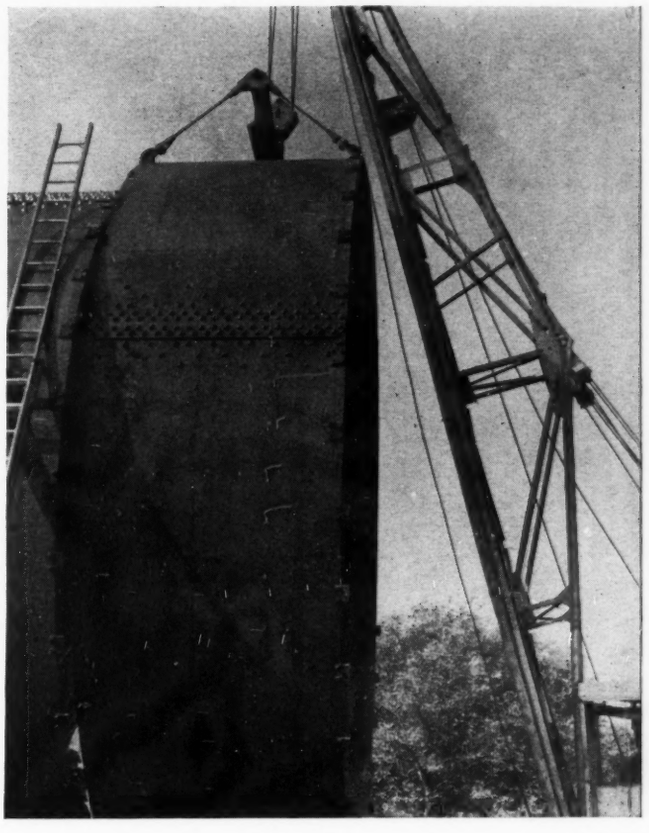


3. **Completed ring** girder being lifted into place. The girder is a plate steel, box type internal circular girder fully welded.

4. **One of the two** girders being set on the rollers. Note manholes at top and bottom for use of the welder installing diaphgrams.

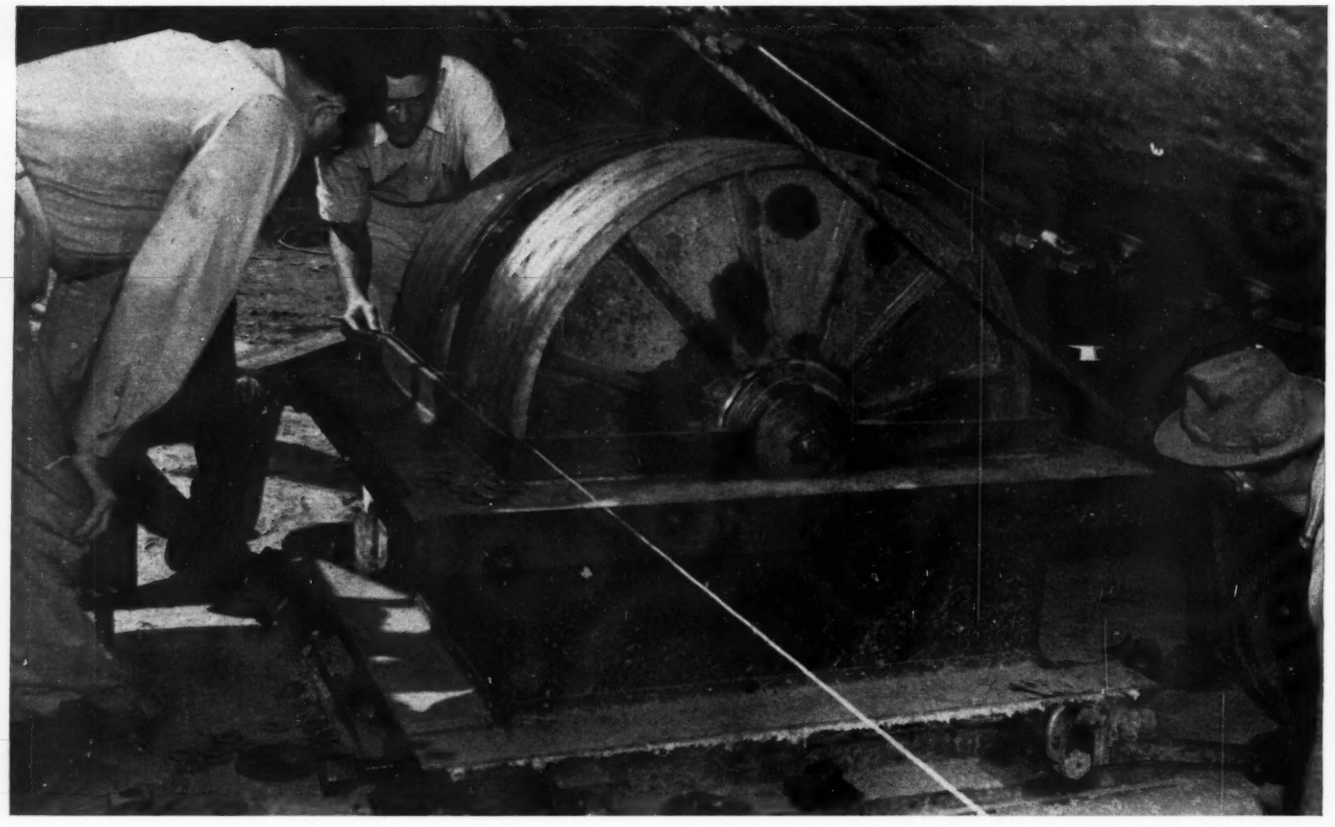


5. **Ring girders,** showing adjustable diagonal brace in place, and the first two ring sections temporarily attached by clamps.

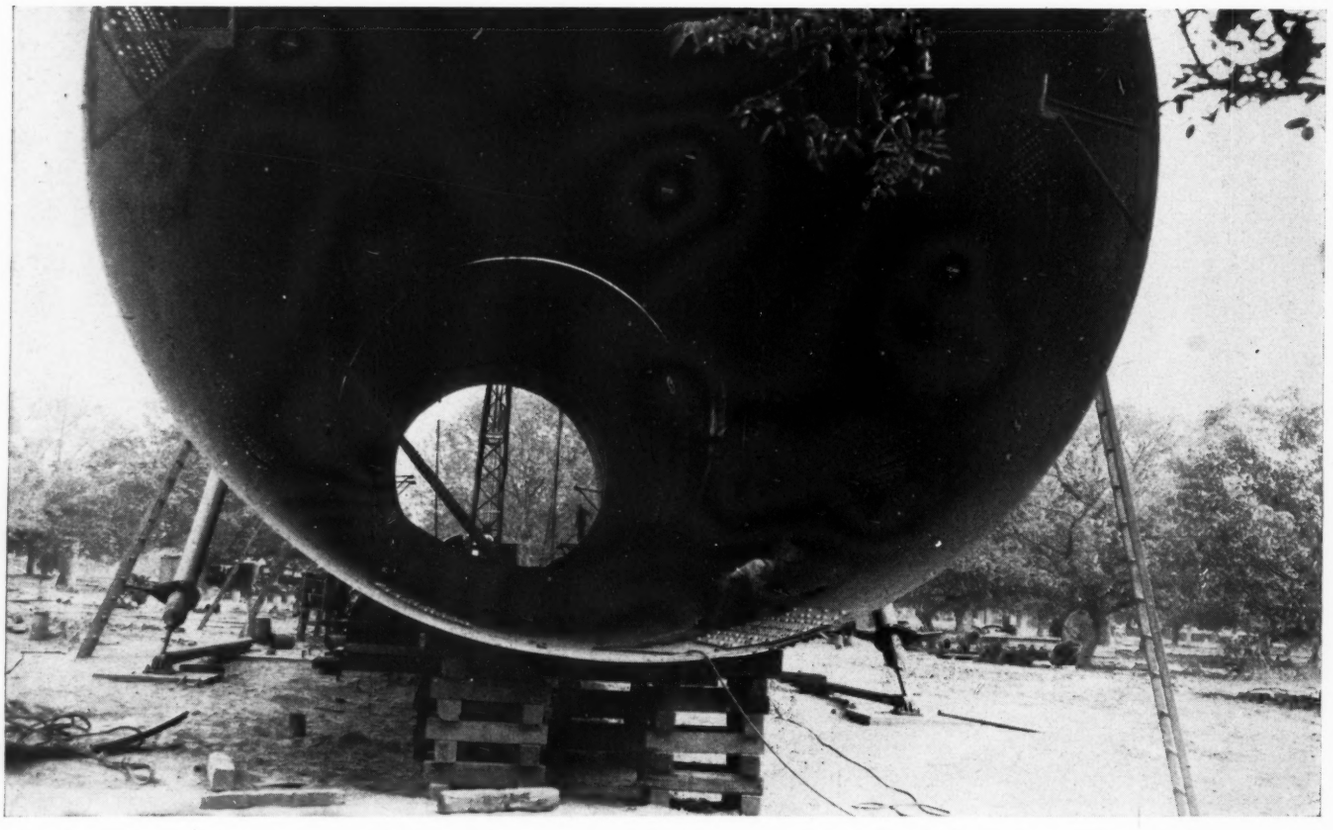


6. **A ring section** being swung into place. The sections are made up of one-inch plate steel with riveted longitudinal seams.

7. **Holder nearing** completion, with ring sections being placed on alternate sides of the girders, cantilevering out. The diagonal braces, also set in a concrete foundation, may be clearly seen here. They will be removed soon, so that welding may be started.



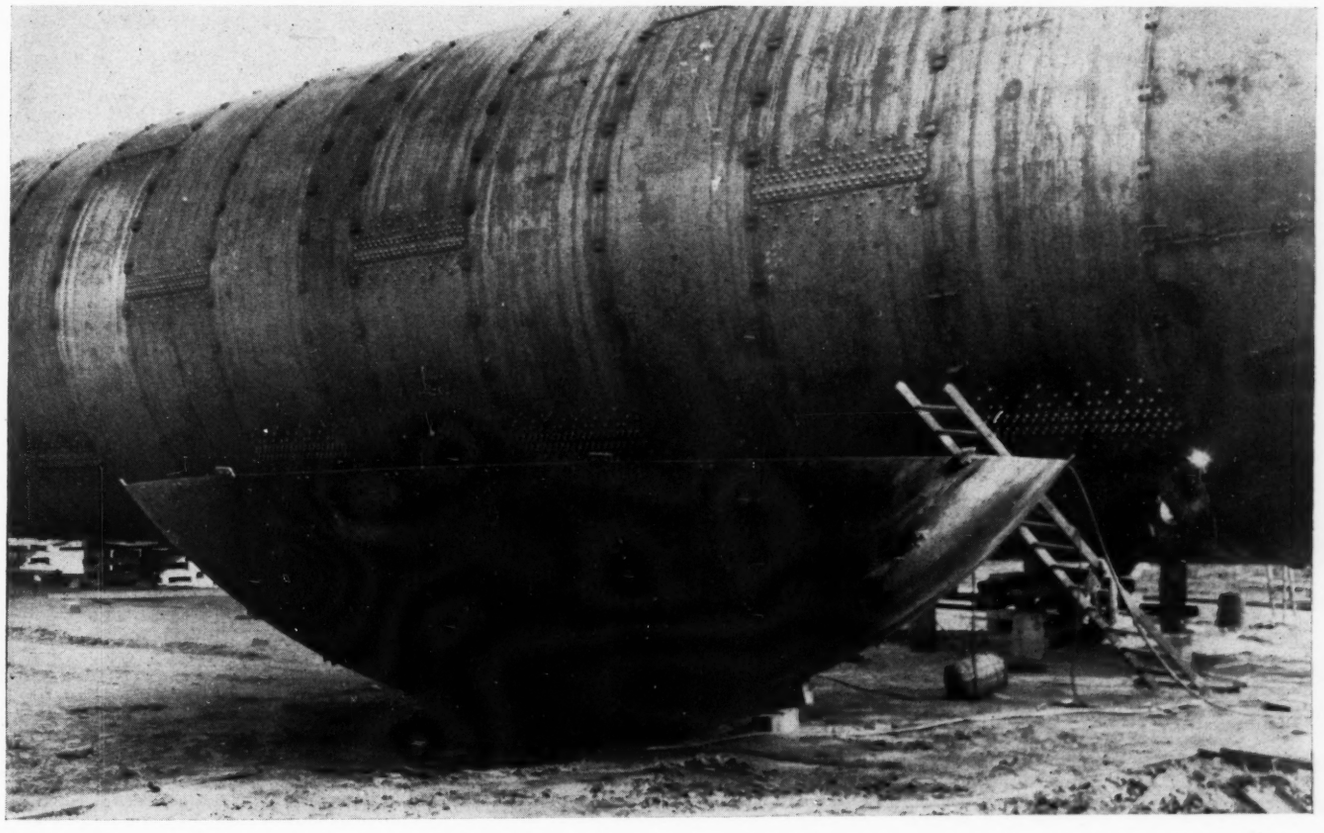
8. **The rollers** are here being adjusted on their bases, in order to close the gap between the two center ring girders. The ring girders are made up of ¼", ⅜", and ½" steel, with exterior plate of 1¼". Soon these two rollers will bear the entire weight of the holder.



9. **Interior view** of holder showing method by which round-about seams are welded. Note that at this stage the gap between the two center sections has not yet been closed, nor have the adustable diagonal braces been removed. Welding will not commence until this is done.

Photographs by Jim Leonard, Southern Counties Gas Co., Los Angeles.

10. Here is the completely assembled holder with diagonal braces removed and welding in progress, as is evidenced by the smoke inside the holder. The cable with which the completed shell is rotated on the rollers may be barely seen just above holder on the left.



11. The final step is the placing of the hemispherical head. So easily does the holder revolve on the large diameter rollers that it may be turned with a hand pinch-bar. After the welding is completed, the holder will be set on a permanent base. Notice welder at right.

Sizing Meters for Home Heating

By C. A. PETERSON

Citizens Gas and Coke Utility, Indianapolis, Indiana

IN recent years the practice of most operating gas companies to reduce the initial cost of gas service to the customer has caused distribution practices to alter considerably. One of the most talked of practices with the advent of home heating has been sizing of home heating meters.

Home heating, a fairly new load to many properties has called for a slightly different type of psychology being exercised on choosing a meter size. The fact that the customer usually has some doubt in his mind about the operating cost of his new convenience is not lessened any when the meter man installs a meter that is almost twice as large in physical dimensions as the user's present meter. There remains the fact that the customer when purchasing the home heating service usually has in mind the modernization of his basement and is not helped any when he awakens to the fact that right in his newly-designed social room is a large meter that is objectionable in appearance as well as taking up considerable space.

All these factors have caused various gas men to question method of meter sizing because they believe it has been far too conservative and based on antiquated experiences.

Method I: About the first method of meter sizing used in the advent of home heating to a property was the 100% connected load idea. For example, appliances are listed and rated at maximum input.

TABLE NO. 1. ESTIMATE OF DEMAND PER HOUR (METHOD I).

Appliances	*Rating B.t.u. Per Hr.*
Range with separate broiler	88,000
Automatic water heater	30,000
Electrolux refrigerator	3,000
Conversion burner	200.000
Total demand B.t.u. per hour	321,000

On 1000 B.t.u. per cu. ft. the demand would be 321,000 divided by 1000 or 321 cu. ft. per hour. Size of meter necessary to supply 321 cu. ft. per hour on .5 in. W. C. absorption would be a 20B tin meter.

On 570 B.t.u. gas the demand would be 321,000 divided by 570 or 563 cu. ft. per hour. Size of the meter necessary to supply 563 cu. ft. per hour on .5 in. W. C. absorption would be a 30B tin meter.

Method II: An Ohio operating group developed the following sizing method based on the reasoning their appliances other than automatically controlled ones through the diversity of their use can be listed at 70% of the manufacturer's rating. Under this method, the meter in the foregoing case could be sized as shown in Table No. 2:

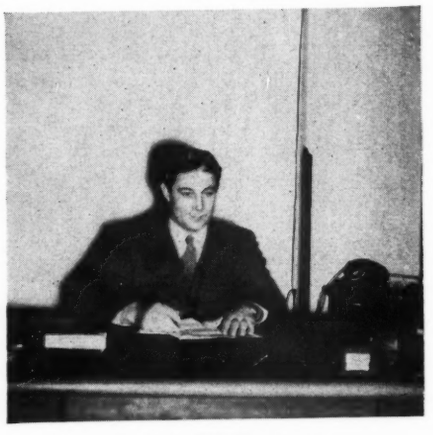
On 1000 B.t.u. per cu. ft. the demand would be 294,000 divided by 1000 or 295 cu. ft. per hour. Size of meter necessary to supply 295 cu. ft. per hour on .5 in. W. C. absorption would be a 10B tin meter.

On 570 B.t.u. gas the demand would be 294,000 divided by 570 or 500 cu. ft. per hour. Size of meter necessary would be 30B.

Method III: In Indiana the past few years the diversity has been applied to the automatic rather than the manually controlled equipment, based in the reasoning that an automatic appliance will operate controlled while a manually operated appliance is subject to humanics. It is also true that conversion burners are usually sized conservatively and in rare instances does the necessary input reach 75% of the manufacturer's rating. A meter size necessary on this method compared to the previously set out methods would be as shown in Table No. 3:

On 1000 B.t.u. per cu. ft. the demand would be 263,000 divided by 1000 or 263 cu. ft. per hour. Size of meter needed would be a 10B tin meter.

THE FOLLOWING paper was first heard at the Mid-West Gas Association School and Conference, held at the Iowa State College, Ames, Iowa, November, 1940. Entitled "Sizing Meters for Home Heating and Apartment House Usage," it was presented by C. A. Peterson, superintendent of customer service, Citizens Gas and Coke Utility, Indianapolis, Ind. Mr. Peterson has been in the gas business since his graduation from Ohio Northern University in 1931, following which he ac-



C. A. PETERSON

cepted a position with the Columbia Gas & Electric Appliance Corp. In 1936 he became assistant superintendent of customer service, Citizens Gas and Coke Utility, Indianapolis, and was made superintendent in 1938. He is now also acting superintendent of the Appliance Installation Department. For the past three years he has served as chairman of the sub-committee "Kind and Quality of Gas," of the Indiana Gas Association. In the following article Mr. Peterson has set down the theories behind the various methods of meter sizing for home loads that are now being used. — (Abstract by G A S.)

On a 570 B.t.u. basis the meter would be a 20B.

It can be seen that under the three methods of meter sizing, that in both instances of natural and manufactured gas, a saving can be effected by a closer

TABLE NO. 2. ESTIMATE OF DEMAND PER HOUR (METHOD II).

Appliances	*Rating B.t.u. Per Hr.*		*Demand B.t.u. Per Hr.*
Range with separate broiler	88,000	at 70%	61,600
Automatic water heater	30,000	at 100%	30,000
Electrolux refrigerator	3,000	at 100%	3,000
Conversion burner	200,000	at 100%	200,000
Total			294,600

sizing of meters. The second method of meter sizing has been in use long enough to be accepted without reservation in that particular operating group. And results from the third method in a manufactured property in Indiana are favorable to its acceptance there. This property had the occasion to field check 200 such sized meters that would have been one size larger under Methods I and II and reported that all meters checked favorably. Records of meters so sized that have been changed and examined, show that no excessive wear has been exercised on the moving parts of the meter.

Under Method III a reduction can be effected in the initial capital required for meters or a large stock can be secured if sufficient number of meters are purchased. The repair problem is simplified as well as reduced in expense and sizes can be standardized easier.

It is realized that the problem is one to be governed by local conditions. It is possible that some operators may bring up the question of pressure loss through the meter and its effect upon appliance operation. Regarding the .5 W.C. design, there is little doubt, in the writer's opinion, that a smaller meter with larger tubes, valves, etc., could be designed on a greater loss without affecting the life or accuracy of the meter. As to the affect on appliance operations, there can be none as the standard heating job is usually supplied with gas regulated to 3½-in. W.C. on natural gas and 3 in. on manufactured gas. As to other appliances, input ratings would be affected very little with say a .3 in. to .5 in. W.C. pressure reduction.

As you will note the heating appliance listed under Method III is a conversion burner and in the event of using a gas designed furnace, the manufacturer's rating should be used at 100%. This exception should be made because the sales practice in sizing a gas designed furnace is usually less conservative than when sizing a conversion burner. The actual meter size will be affected little because the range of size on gas designed equipment is more flexible than on the conversion burner.

TABLE NO. 3. ESTIMATE OF DEMAND PER HOUR (METHOD III).

Appliances	*Rating B.t.u. Per Hr.*		*Demand B.t.u. Per Hr.*
Range with separate broiler	88,000	at 100%	88,000
Automatic water heater	30,000	at 75%	22,500
Electrolux refrigerator	3,000	at 75%	2,250
Conversion burner	200,000	at 75%	150,000
Total			263,000

ELECTRICAL BONDING For Cathodic Protection of Pipe Lines

By SCOTT EWING
American Gas Association Research Associate

WHEN cathodic protection is applied to a pipe line to prevent corrosion of the pipe, one or more anodes, consisting of old pipes or rails, are buried near the pipe line. An electrical potential is then applied between the anode and the pipe line, so as to force current to leave the anode, flow through the earth to the pipe line, and return to the negative side of the D.C. generator.

Many gas lines are joined by means of mechanical couplings having rubber gaskets, and the current cannot readily flow along the pipe line unless the couplings are bridged with metallic conductors. One of the major items of cost in applying cathodic protection to such lines is the installation of the conductors across the couplings. Various methods such as soldering, brazing and welding have been used for joining these conductors to the pipe but the joining methods have not been entirely satisfactory, and occasional failures have resulted in no protection on parts of the line. Aside from the corrosion resulting from lack of protection, the location and repair of broken bonds is expensive.

A method of bonding is needed which is as economical as possible, but it is more important that the bonds be permanent and be made without mechanical difficulties. On new pipe line construction most of the joints should be bonded or conducting gaskets should be used in the couplings, if it is thought that cathodic protection will be installed at some future time.

On most old gas lines the digging and filling of the holes is likely to be the principal cost item in installing bonds. Other costs include (1) the conductor or bond, (2) preparation of the pipe surface, (3) attachment of the conductor to the pipe, and (4) protection of the bond against corrosion. One should also consider the possible danger of heating the pipe to a high enough temperature to cause it to burst but this is not likely to happen except when the oxyacetylene flame is used for high-temperature brazing or welding.

The requirements of the pipe line operator and the considerations which permit rapid and economical production have been embodied in the steel terminal copper conductor shown in Fig. 1. The conductivity can be varied by adjusting the width of the copper conductor which is 3/16 in. thick. A 3/16-in. steel wire, of the same length as the copper strip, is welded into the steel ferrule with the copper strip. This wire can be bent and welded to any part of the pipe coupling if desired, but there is disagreement among pipe line engineers as to the necessity of bonding to the couplings. The ferrule is attached to a 2 in. x 2 in. x ¼ in. steel plate which is curved to fit a 6-in. pipe. It is more convenient for the user to reduce this curvature, if necessary, than it is to produce the desired curvature from a flat plate.

After it is made, each bond is subjected to a pull which exceeds the elastic limit of the copper strip. Some of these bonds have already been applied to pipe lines. They are as strong as it

DR. SCOTT EWING

THE PURPOSE of a bond between underground structures is either to equalize electric potentials, or to permit current flow. In both cases it is obviously necessary to provide good and permanent contact at the point of attachment of the bond to the structure as well as a continuous electrical path through the bond; in the latter case it is also necessary to have sufficient cross section of bond metal, not only in the bond itself but at the point of attachment, so that adequate electric conductivity is developed. While the following paper, presented at the 22nd Annual Convention of the American Gas Association by Dr. Scott Ewing, research associate, National Bureau of Standards, Washington, D. C., and entitled "Electrical Bonding for Cathodic Protection of Pipe Lines," has been written for cathodic protection engineers, the same considerations would apply to bonding for control of street railway stray currents, and similar procedures. — Editor.

is possible to make them, and they are probably cheaper than any other type of bond when all costs are considered.

Since these "bonds" are radically different from any type of rail bond it may be preferable, in order to avoid possible confusion, to identify them with a different name such as "coupling shunt" or "coupling jumper." In order to minimize possible danger of overheating the pipe, the welder should weld one side of one terminal, then one side of the other. He should then finish the first terminal and finally finish the second.

Protection Against Corrosion

Probably the principal cause of failure of improperly joined bonds is the corrosion of the steel adjacent to the copper or brazing metal. If the contact with the brazing or welding metal is not perfect, moisture will penetrate between the metals and corrosion products will form. The pressure which these products are capable of exerting could easily cause failure of a poor joint. Cathodic protection could not be effective in such a cavity.

Careful examination of bonds that have failed might show whether the joint was originally weak and the failure was mechanical, or whether corrosion under the "weld" was the principal cause of failure. At any rate these considerations indicate that every possible precaution should be taken to prevent failure at the copper-steel juncture.

The factory weld between steel and copper as made on steel terminal copper bonds is likely to be better than a weld produced in the field. There should be enough slack in the conductor to keep it at least several inches from the pipe and coupling at all points except at the ends. This should prevent any galvanic corrosion of parts of the coupling or pipe which might otherwise be near the copper.

In order to further insure permanence of the bond the most moisture-proof coating obtainable should be applied at the juncture of the copper and steel. The following is suggested as a method for coating bonds: Immediately after the bond is applied, the wire, terminal, weld and adjacent pipe should be cleaned with a wire brush and a thin coat of primer applied while the pipe is still hot. The primer will dry in a few minutes. A little very hot enamel should then be poured over the joint before the pipe cools off. This will insure penetration of the enamel into any depressions or cavities and will insure a good bond between the enamel and metal. After the pipe cools another coat of enamel at a lower temperature should be applied.

The small amount of enamel required could be heated in a gasoline or kerosene job furnace of the type used to heat lead and parffin; or perhaps an electric heater might be operated from the welding generator, which would be idle most of the time. Cold enamel could be added to the pot immediately after the first application. This would lower the temperature of the enamel for the second application. There are, of course, many other ways to coat the bonds which might be better adapted to the equipment available.

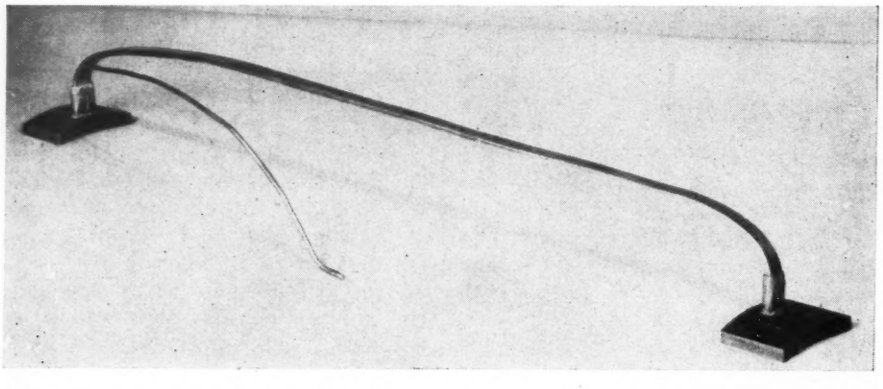


FIG. 1. Copper Strip conductor with steel terminals for connecting across pipe line couplings.

■ ■

Natural Gas Service Planned For Eureka, California

Permission was recently granted the Pacific Gas and Electric Co., San Francisco, by the California State Railroad Commission to construct and maintain a natural gas line to the town of Eureka, Calif., and to serve that town and nearby territory with natural gas. The line is to extend from Eureka to the fields of the Texas Co. at Tompkins Hill, about 14 miles southeast of Eureka.

The commission found that the quality, pressures and probable reserves of the gas field were such as to justify the proposed expenditures necessary to furnish the Eureka area with natural gas.

■ ■

Pipe Lines To Be Protected From Sabotage or Attack

Edward R. Stettinius, Jr., of the National Defense Commission, announced that the Amercan Petroleum Institute had created several committees to work out with military authorities a plan of protecting oil-supply lines and storage facilities against possible attack or sabotage.

Surveys will be conducted in five regions designated as Northeastern, Southeastern, Great Lakes, Central and Western.

■ ■

Sweet-Gas Wells Defined By Texas Commission

The Texas Railroad Commission recently issued an order applying to the Panhandle field, fixing a method of classifying sweet and sour-gas wells. Its immediate effect will be to close some 100 wells in the Panhandle.

The order resulted from a hearing held in Austin recently at which it was testified that some of the wells on the commission's sour-gas schedule were producing sweet gas which was being used to manufacture carbon black.

■ ■

Natural Gas Pipe Line Co. Halts Wisconsin Work

According to recent reports, the Natural Gas Pipe Line Co. of America, Chicago, has stopped construction work in Wisconsin, due to an order of the Highway Commission which prevents them from crossing highways in that state.

It is said that work will not be resumed until matters of right in the state of Wisconsin have been settled.

■ ■

Natural Gas Soon for Kentucky Areas

With the completion of mains now being laid, residents of Kentucky from Frost west to the South Portsmouth school are soon expected to be served natural gas. The service is being installed by the Warfield Natural Gas Co. of Ashland, Ohio, which will purchase the gas from the United Fuel Gas Co.

Approximately 60 men are now working on the project, which began November 5.

GAS DISPATCHING

On the United Gas System

THE task of maintaining the balance between the gas input and output of a natural gas pipe line system of some 6400 miles length, such as that of the United Gas Pipeline Co., is difficult enough at best. To successfully maintain it in the face of varying conditions of operation and of consumer demand resulting from the rapidly changing weather situations of winter calls for a capable and well organized dispatching force.

The control center for United's far flung web of lines is the chief dispatcher's office located in Shreveport, La. To this point comes a continuous flow of reports from the 103 dispatchers located at 31 strategic points along the line. (See map.)

With these reports before him, the chief dispatcher has a complete picture of flow and pressure conditions throughout the system, and he can readily determine at what points on the system withdrawal from the wells should be increased or decreased. So absolute must be the chief dispatcher's control of the gas flow in order to maintain proper operating pressures in every district that not even a shut down on a line to repair a break can be made without first notifying him and receiving an O. K.

Under normal conditions the dispatchers located at points on the company telephone system hourly report the pressures and rates of flow in their areas to the district dispatcher who in turn reports to the chief dispatcher. (Fig. 1 shows a typical dispatcher's office). Dispatchers located at points not reached by the telephone system report over commercial telephone or telegraph lines at less frequent intervals.

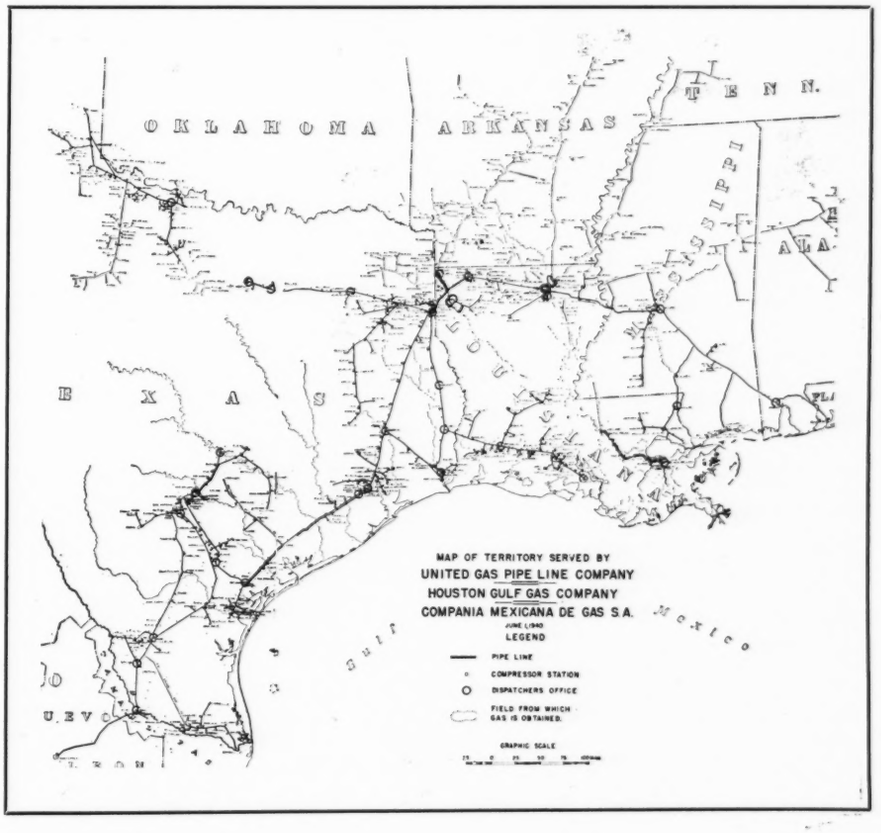
If any unusual situation in pressure or rate of flow develops, the local dispatcher observing the situation immediately notifies the district dispatcher and chief dispatcher. During abnormal load conditions brought about by cold weather, breaks on some of the lines, or routine repairs on other parts of the system, the local men report as frequently as may be necessary to keep the chief dispatcher fully advised.

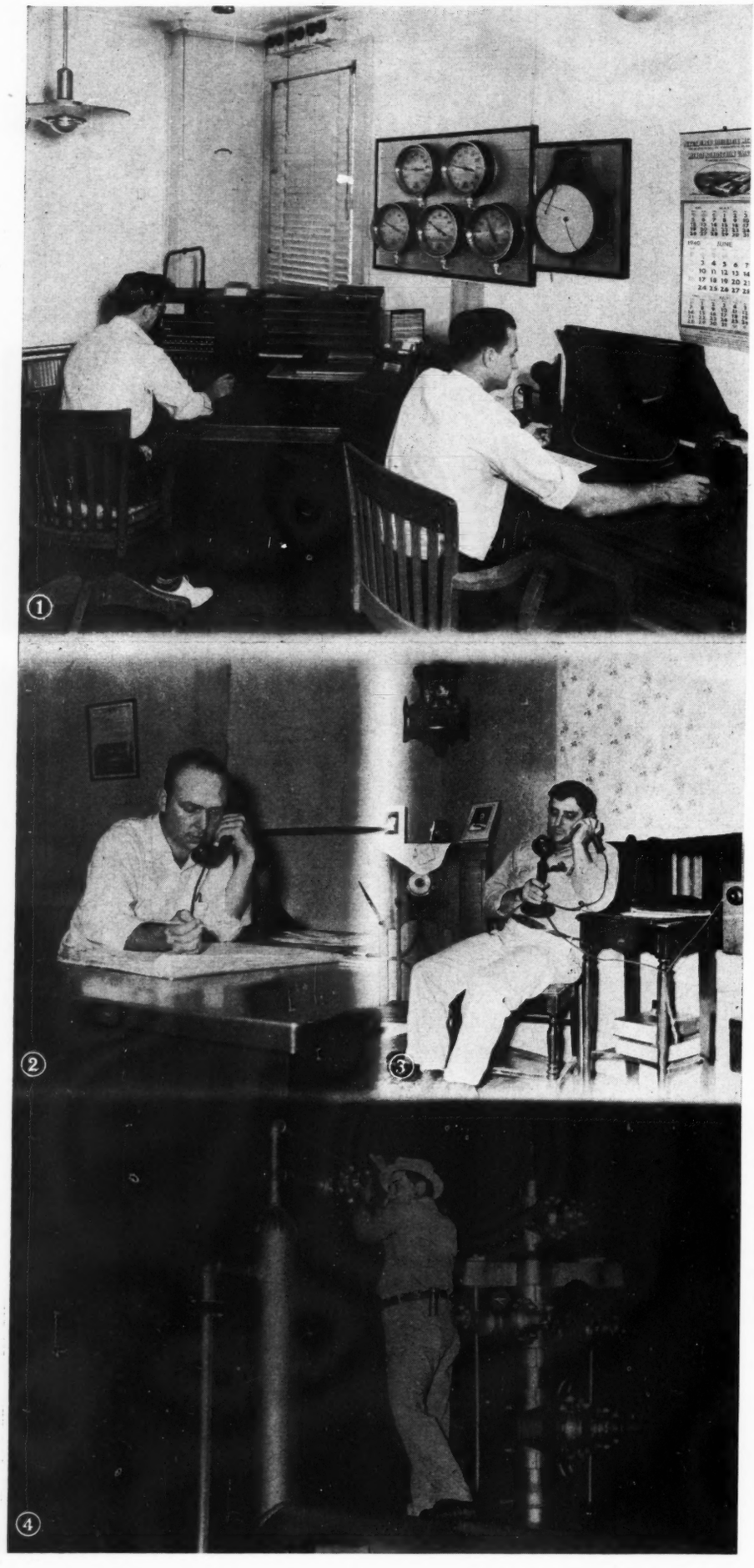
Gas is withdrawn from the various fields, and wells from within the fields, in accordance with proration schedules prepared by the field pipe line department. These schedules are followed by the dispatcher as closely as operating conditions permit, and excesses and deficits between the schedules and the actual takings are balanced as quickly as possible. Changes in the rate of flow from the wells connected directly to the gathering system are made at the direction of the dispatcher by 64 meter and well attendants who are located in the field. The number of wells in the charge of each man varies according to the distance between wells, the nature of the terrain, and in some cases according to the producing ability of the wells. These men are available at any hour of the day or night, as is seen from Fig. 3. Some wells delivering at a common point of the gathering system are regulated by the owners.

In addition to the regular dispatching force, 11 station attendants are on duty during the day at the important delivery points supplying city gate and industrial customers. Although these men are not classed as dispatchers, they do perform certain dispatching duties such as reporting pressures and advising as to any unusual operating conditions during the periods of heavy consumption.

The compressor station department also plays an important part in maintaining the flow of gas through the lines in the desired volume and at the pressure required. Increased demands mean putting additional engines on the line and increasing the pressure. On the other hand, a decrease in customers' requirements necessitates shutting down engines and lowering the pressure on the line.

Since the compressor station department plays such a vital role in the





movement of gas through the system, it is necessary that the dispatching department maintain a close contact with compressor station operators and keep them fully advised as to variations in load demands.

Sudden emergencies sometimes occur, one of the most serious being a break in the pipe line. When this happens, the dispatcher in that area is usually the first to become aware of it because of the rapid drop in line pressure, and the dispatching department immediately notifies the pipe line repair crew nearest the break so that repair work can be started without delay. Most breaks are repaired under pressure to avoid shutting the line down.

The dispatching department has to take into consideration many variable conditions in directing the movement of gas. The season of the year, atmospheric temperatures, the day of the week, wind velocity, time of the day, are all factors governing the load demand on the line.

Anticipating changes in customers' demands due to weather conditions involves more than the mere consideration of an increase or decrease in temperature. Different combinations of weather conditions produce varying results. Cloudy, windy weather means increased gas consumption all along the line. Lowering temperature on a clear day oftentimes does not effect load demands as greatly as cloudy weather with normal temperature.

It is interesting to note that when the weather becomes cloudy over a wide area, load demands increase because more fuel is required by refineries to compensate for increased radiation losses of stills and other apparatus exposed to atmospheric conditions.

To make gas available at the time, the place, and in the quantities needed, requires that the chief dispatcher have, first, an efficient and experienced force in the field to report conditions and carry out the operating orders, second, a thorough knowledge himself of field operating conditions, and, third, the organizing ability to keep the entire system lined up in anticipation of unexpected changes in the weather or other operating factors.

(1) The Dispatching office, South Junction, San Antonio District. Will Rogers at switch board and R. E. Wagner, district dispatcher, at telegraph instrument. (2) W. A. Chapman, dispatcher, calls M. W. Hallman (3) at his home at night instructing him to put a well on the line. Mr. Hallman (4) is completing this job ten minutes later.

Pipe Line Stream Crossings

By ROBERT T. KNAPP
Associate Professor, Hydraulic Engineering
California Institute of Technology
Pasadena, California

PART III. TYPES OF PIPE LINE STREAM CROSSINGS . . . Buried Crossings . . . Cable Crossings . . . Comparison of Various Crossing Types

SEVERAL types of construction are possible for a pipe line crossing which is buried in the stream bed. The simplest of these is the heavyweight pipe line buried in a trench with no supports or external weights between the banks of the stream. If lightweight pipe is used, it must be prevented from flotation and movement. Two methods have been used for this purpose—the application of external weights, and the use of vertical pile anchors to divide the pipe line into relatively short spans.

A. *Heavy-walled Pipe Crossings:* Most of the problems arising in the analysis of the simple heavy-walled pipe crossing have already been discussed in the previous sections. The cardinal principles of such a design are (1) that the unit weight should be great enough so as to preclude any possibility of an upward movement of the line due either to the buoyancy of the line or to dynamic forces caused by the flow, and (2) the depth below the normal river bed should be sufficient to prevent the line from being subjected to very high velocity flow in channels excavated during floods.

B. *Lightweight Crossings with Pile Anchors:* The basic factors determining the forces to which buried crossings are subjected are the same for all types of design, but the resistance of the line to these forces varies greatly. Pipe lines with pile anchors will be nearly always divided into spans so short that the load will be carried entirely by bending without any appreciable contribution from the catenary effect. This can be seen by reference to Fig. 1 which shows that for a pipe of 14-in. diameter on a 50-ft. span from 97 to 99% of the load is carried by the beam action.

(1) Forces on Connections and Piles: The connection between the line and the pile demands careful consideration. The bearing forces are high and thus a thin-walled pipe should be reinforced to prevent collapse by crushing. The design of the pile itself will not be discussed since this is beyond the scope of this paper. However, the external conditions under which the pile must work deserves consideration. In the first place it must be assumed that during flood times channels will be excavated by the flow across the line of the crossing, thus exposing sections of the line and the piles to the dynamic forces of the flood. The piles themselves must, therefore, support not only the resultant thrust on the line, but also a similar thrust on the upper portion of their length that is excavated by the flow.

One simple and obvious conclusion immediately suggests itself; i.e., that the piles should project as little as possible above the top of the pipe. The vertical pile will be a source of local disturbance in the flow and thus it should be assumed that the excavation around the pile will be considerably deeper than the average of the channel. Thus the cantilever length must be taken great enough to compensate for this added excavation. It should be noted in passing that an intersection of two cylinders in a flow sets up an interference which produces a drag in excess of that which would be produced by the two cylinders acting independently. However, this is not a major effect and can be covered in the normal factor of safety.

It is, of course, impossible to predict the exact behavior of a major flood. Therefore, in a pile anchor crossing, it is always possible that a pile or two may be excavated so deeply as to become valueless in the support. Conservative design thus demands that the line be investigated to see if the additional load can be thrown on the pipe line and the adjacent piles without failure.

C. *Crossings with External Weights:* Another possibility for the use of a thin-walled pipe in buried crossings is to provide it with external weights in place of pile anchors. The only role that these weights can play is, of

R. T. KNAPP

PRESENTED on these pages is the third of a series of three articles by Professor Knapp on the topic of Pipe Line Stream Crossings. This paper was first presented before the Spring Technical Conference of the Pacific Coast Gas Association, held in Los Angeles, April 11 and 12, 1940. Professor Knapp received his B. S. from the Massachusetts Institute of Technology in 1920; his Ph. D. from the California Institute of Technology in 1929. He has been consultant for the Metropolitan Water District of Southern California (1934-1936); collaborator, Soil Conservation Service, U. S. Department of Agriculture (1935-1936), and at the present time is associate professor of hydraulic engineering at the California Institute of Technology. — Editor.

course, to increase the effective weight of the line. If properly designed they can prevent the possibility of the line floating during flood times. However, they act to increase rather than decrease the dynamic forces on the line after it becomes exposed to the flowing fluid. Therefore, the line itself must have sufficient strength to carry the total dynamic load.

II. Cable Crossings

No attempt will be made here to discuss the detailed factors entering into the structural design of pipe line crossings of the suspension type. The purpose of this section is to outline and investigate the hydraulic factors which may affect the design of such structures. However, in so doing, it will be convenient to make a few brief remarks on the general design itself. The two types of suspended crossing that are of interest for pipe lines are the crossing employing a single central pier and tower in the stream and the crossing with a single free span from bank to bank.

A. *Central Pier Suspension:* In the central pier type of crossing the pier itself is the critical point. The hydraulic considerations surrounding its design are much the same as those for the piles in the pile-supported buried crossing. The pier will normally be considerably larger than any pile for use in the latter type of crossing. Therefore, it is probable that the relative depth of scour surrounding the pier will be even greater than that around smaller piles in the same channel. In addition to this, the pier rises through the entire flow and thus is subjected to the stream drag over this added area. The pier also has the likelihood of catching a considerable quantity of debris which substantially increases its frontal area and thus the drag force of the stream. In addition to this, unless it is supported a sufficient height above the maximum flood level, the pipe line may also catch floating debris and thus contribute to the horizontal force on the center pier.

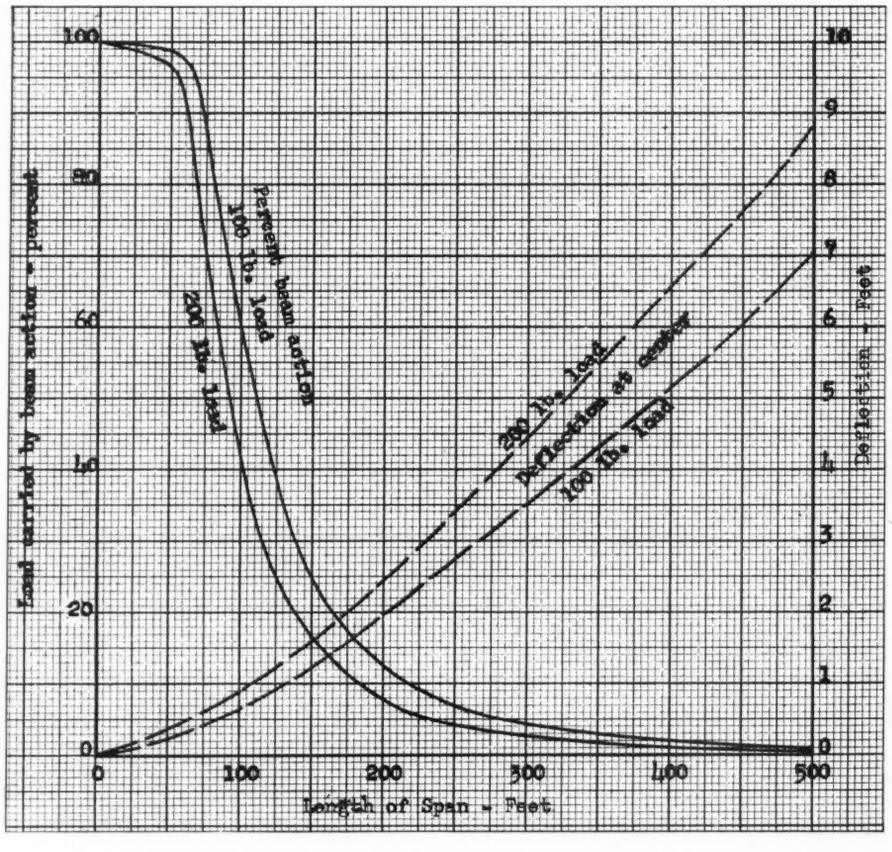
B. *Clear Span Suspensions:* The clear span type of crossing has two towers instead of one. However, the foundations for these towers are on the stream banks and thus should not offer such a severe problem to the designer. The prospective site should be investigated thoroughly and rejected if there is reasonable possibility that future side scouring of the stream will encroach upon the tower foundations. In many cases the towers will be located in areas subjected to possible overbank flooding, accompanied, however, with little or no velocity of flow. Adequate foundations must therefore be provided for the towers to take care of conditions in which the bearing capacity of the upper layers of the soil has been greatly reduced by saturation.

Cable anchors are subject to the same considerations as tower foundations. In the clear span crossing the anchors normally will be in a more favorable location than the tower foundations and thus present fewer difficulties. On the other hand, in central tower crossings there is a tendency to place the cable anchors as close to the banks as possible, and thus they become critical factors in the design. For example, a small movement of the cable anchors may be sufficient to drop the pipe line into the upper layer of the flood, where it will be subjected to extremely high velocities and correspondingly great horizontal forces. The latter may be enough to cause complete failure.

When the pipe line approach to the crossing is in line with the latter and approximately normal to the stream, the pipe itself may furnish a most excellent anchor for the cables. The resistance to the axial movement of a buried pipe has already been discussed. In case the line is to be used for anchorage, it must be examined to see that there is no possibility of vertical motion upward due to the vertical component of the cable load and the buoyancy of the line itself. This latter effect may be serious in case the approach area is subject to flooding. It is well known that if a light permeable soil becomes saturated with water, the pipe line may rise due to its buoyancy. Thus it may be desirable to anchor the line in the approach area by means of piles or weights.

C. *Cable Design:* Suspended pipe crossings are in general quite simple in design. Therefore, in the analysis of the suspension cable, it is advisable to

FIG. 1. Effect of span on deflection and partition of load between beam and catenary actions.



examine the physical loading conditions to see whether or not it is justifiable to employ catenary or parabolic analyses. In this connection it should be remembered that the catenary is a curve of a flexible cord subjected to a uniform load per unit length of the curve, and a parabola is subjected to a uniform horizontal unit load. In many pipe line suspension crossings vantage is taken of the rigidity of the pipe to reduce the number of points of support from the suspension cable. The spans are usually made long enough to develop a reasonable bending stress in the pipe. This procedure throws the points of load application on the cable so far apart that it requires a great stretch of imagination to class such a construction as satisfying the load assumptions for either a parabola or a catenary. In such cases the most satisfactory method of design is that of the string polygon. If the specific weight of the cable is appreciable, each section between hangers can be treated as a catenary and the change of slope computed between each set of hangers.

D. *Vibration of Suspension Crossings:* A simple suspension crossing of the type under discussion is quite flexible. It is also very elastic; i.e., it dissipates energy very slowly. Therefore, relatively small external forces may set up an appreciable vibration in the entire structure. The most common source of such periodic external forces is a cross wind. Under this condition, the air flow around the pipe may become unstable, with the result that a pulsating force acts on the line. This is an aerodynamic phenomenon known as "flutter." The resultant vibration usually is in the vertical plane.

In general such vibrations produce comparatively low stresses, although if the forces are in resonance with the period of the structure, the condition may become serious. In any case, each individual motion represents only a small amount of energy and can be readily suppressed by the provision of proper dampers or frictional energy dissipators. For example, if a small amount of sliding friction is introduced at the points of attachment of the hangers to the pipe, casual vibration should be greatly reduced.*

E. *Pipe Lines Suspended as Catenary:* It is felt that one additional type of suspension crossing deserves consideration for future applications. There seems no good reason why the pipe line itself should not be suspended across the stream as a simple catenary. Examination of Figs. 1 and 2 indicates that in many cases it could be a very flat one: i.e., the dip could be quite small. The maximum loading would, of course, be only the weight of the line and its contents, plus a small allowance for wind load. Thus in the numerical example shown in Figs. 1 and 2 the 100-lb. load is about the maximum that could be reached. Fig. 1 shows a 7-ft. sag for a 500-ft. span, with this load, and Fig. 2 indicates a unit stress of about 24,000 lbs. per sq. in. If the sag were increased a few feet, the stress would be reduced to a very acceptable figure. For such a construction, the pipe line would normally be its own anchor. It is believed that this type of construction was also proposed by Prof. R. R. Martel of the California Institute of Technology some time ago for use with a center pier type of crossing.

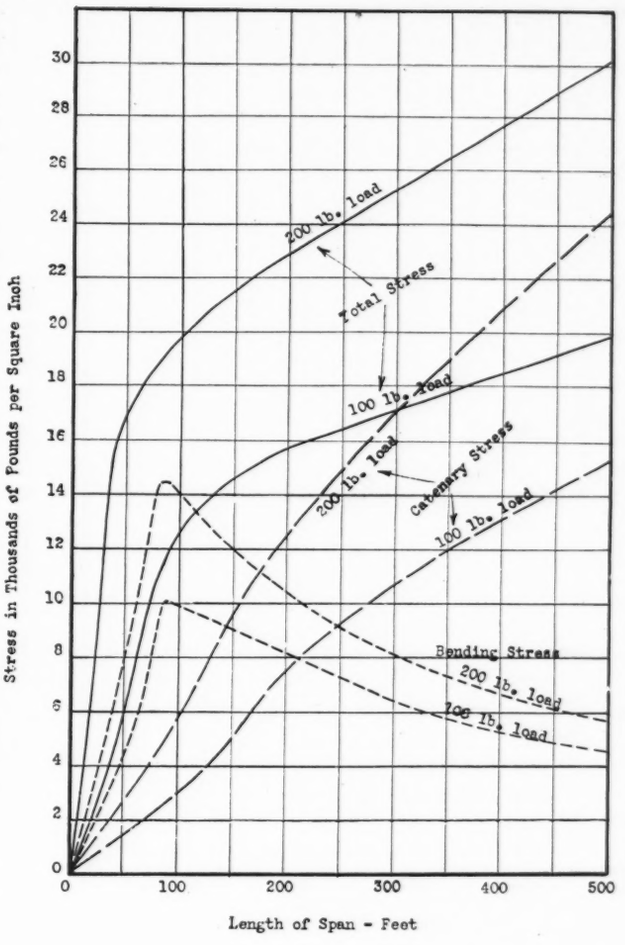


FIG. 2. Effect of span on bending, catenary, and total stresses.

COMPARISON OF VARIOUS CROSSING TYPES

THE preceding designs readily fall into two classifications — buried crossings and aerial crossings. All of them have their field of application but none are universally applicable.

I. Buried Crossings

Of the three types of buried crossings previously considered, it is the opinion of the writer that the properly designed heavyweight pipe line is the safest and most rugged. For new installations or for complete replacements it should be given most careful consideration.

As previously stated it must be assumed that pipe lines buried under stream beds will be subject to partial excavation during major floods. Under these conditions the heavyweight line has several points of superiority. It resists damage from the moving debris. Large boulders which may be present in the bed load would stand little chance of damaging it. It offers the least opportunity for materials such as roots and deep-floating branches to catch and build up the drag load. Due to the heavy wall it has good resistance to abrasion and even if the protective coating is scoured off during a flood its relative resistance to corrosion is great. It is probable also that this type of pipe line will tend slowly to bury itself deeper and deeper in the bed as section after section is excavated or loosened during floods. For this reason it is felt that it would be good practice to bury such a line with a slight bow in the horizontal direction. This would give a little more slack for deeper self-burial during floods. However, to obtain all of these advantages, it is necessary that the weight per cubic foot

*In this connection it is interesting to note that "flutter" has been observed on suspended pipe lines for some time. For example, the occasional occurrence of such a vibration was called to the attention of the author by the engineering staff of the Industrial Fuel Supply Co. at the time of the design of the Saugus suspension crossing, *i. e.*, in the fall of 1938. Discussion brought out the fact that the vibration seemed unaffected by the rate of flow of gas through the line, but only took place during periods of reasonably high wind. Thus it appeared quite evident that this was a case of "flutter" and, at the author's suggestion, friction dampers were installed on the pipe hangers. To date no vibration has been observed on this suspension crossing. The existence of "flutter" has also been troublesome on long spans of high tension lines. Here the engineers have solved the problem by installing tuned vibration dampers at the points of attachment to the insultors. The magnitude of the vibration and resulting stresses that can be built up in an undamped structure under severe conditions, has recently had a most striking demonstration. There seems little doubt that the failure of the Tacoma Narrows Suspension Bridge was the result of aerodynamic "flutter."

of displacement be sufficiently high. For the type of streams encountered in Southern California this weight should be never less than 90 lbs. per cu. ft.

The lightweight pipe crossing, with adequate pile supports, would seem to be quite a satisfactory type of construction. However, one of its major fields of application appears to be for strengthening existing crossings which were installed without satisfactory anchors. Cost figures are not available to the writer, but it would be estimated that for new installations heavyweight lines could be installed at least as cheaply as lightweight lines plus adequate piles and connections. The lightweight line would certainly not be as resistant to damage by various types of debris as would the heavyweight one. It is to be expected, therefore, that maintenance costs would be higher with the lightweight crossing. A corollary of this is, of course, that the reliability would be somewhat lower.

It is felt that a crossing of lightweight pipe anchored by attached weights is not a satisfactory construction in locations where there is the possibility of any appreciable flow around the pipe. To be acceptable these weights must be great enough to bring the effective specific weight of the line up to the figure previously set for the heavyweight line. To avoid prohibitive expense, these weights must be made of some relatively low density material such as concrete. They therefore must unavoidably increase the projected area of the pipe line and consequently increase both the drag and the lift forces on the line. Such a line will have a much lower steel cross section per unit of displaced volume than that of the heavyweight line. If a flood flow excavates a channel across such a line, the amount of support possible from the catenary effect will be quite small due to the small percentage of steel. For this reason the safe span will be limited largely by the allowable bending moment. This span will be of the same order of magnitude as the pier spacings of the pile anchored line. In general this will be less than the probable flood-channel width. These factors all point to the conclusion that weight-anchored lines should be used only in areas subjected to simple flooding. It is suggested in case such a construction is used that even under these conditions the weights should be attached firmly to the pipe so that they cannot slide in case of settling or other unexpected conditions. If several of these weights were concentrated in an area in which the pipe line had little vertical support, they might be the cause of a line failure.

There is one minor effect which applies to all types of buried pipe lines. It was mentioned briefly in section C that an anchored pipe line has no direct longitudinal tensile stress due to the internal pressure. However, the internal pressure should increase somewhat the rigidity of the line. Thus it is probable that during flood times a line carrying normal pressure has a slighly larger safety factor than if the pressure is cut off.

II. Aerial Crossings

The only aerial crossings that have been discussed are the two types of suspension crossings. One other very common type is a line supported as a pier bridge. Pier-supported aerial lines would seem to combine the bad features of the suspension crossing and the pile-anchored buried crossing without offering many compensating virtues. Each pier is subject to the same design considerations as those of the central pier of that type of suspension crossing. Likewise unless the line itself is carried excessively high, it may collect floating debris and build up a high drag load. It is felt that this type should be reserved largely for temporary installations or for locations where there is no possibility of major floods. Of course, these comments are not intended to discourage the utilization of existing well-designed highway bridges for supporting pipe lines in cases where such structures are available.

Of the two suspension crossings the clear-span type appears to be the most desirable. In the majority of cases it should be much simpler to protect tower foundations on the banks than in the middle of the stream. Likewise, there is a better chance for getting satisfactory anchorages for the clear-span type, since they will normally be removed further from the edges of the banks. Of all the suspension designs, it is felt that the use of the pipe line as its own catenary support would give the most rugged and maintenance-free installation.

Acknowledgements

The writer wishes to express his appreciation to the Industrial Fuel Supply Co. of Los Angeles and its president, Leroy M. Edwards, for their permission to present this paper. The material incorporated in it is largely an extract from a report on the same subject prepared by the writer for the company at its request. Acknowledgment is also due to the engineering staff of the company who were extremely helpful in obtaining much of the information which formed the background of the treatment. In addition, the Los Angeles County Flood Control District was very helpful in providing information regarding flood flows and flood damage in southern California.

■ ■

Natural Gas Proposed For Washington, D. C.

THE District of Columbia Public Utilities Commission, after a two-year investigation of the possibilities of introducing natural gas to that area, has published a report by its consulting engineer. The report proposed the full use of natural gas by the Washington Gas Light Co. beginning this spring, and recommended a 40% reduction in gas house-heating rates. The commission indicated that a public hearing would be held this month.

If the commission plan is adopted, natural gas would displace the mixed product, which now contains between 30 and 35% natural gas by volume. Only consumers using gas for house heating would receive the 40% reduction. The plan would necessitate adustments to almost all gas appliances in homes of the company's 200,000 customers, as well as to its plants and supply lines.

■ ■

Milwaukee Pipe Line Costs Estimated

In the course of the hearing conducted by the Federal Power Commission to consider applications for permits to construct natural gas pipe lines from the Panhandle and Hugoton areas to Milwaukee, estimates of the cost of construction were presented by Western Natural Gas Co. and Independent Natural Gas Co.

Western's estimate of the total cost was $26,208,154, while that of the Independent Natural, as of the first year, was $31,952,478.

■ ■

Pipe Lines May Use Bridges Says Texas Commission

In a recent announcement of policy, effective until further notice, the Highway Commission of Texas has granted pipe line companies permission to attach lines to highway bridges.

However, permission will be granted subject to the following conditions: That companies indemnify the Highway Commission against any damage to the bridge structure or the traveling public; that attached lines in no way obstruct water or traffic flow.

■ ■

Natural Gas Service For Kewanee, Ill.

The Public Service Co. of Kewanee, Ill., has been authorized to increase the heating value of gas supplied its customers in Kewanee and Galva, the change to result in decreased rates for gas in these cities.

The company has been supplying manufactured gas of 565 B.t.u. per cubic foot and now will distribute natural gas having a heating value of approximately 1000 B.t.u.

■ ■

Picayune, Miss., Contract

Ray Littrell, of the Littrell Construction Co., Inc., Opelousas, La., has opened an office in Picayune, Miss., to supervise installation of a natural gas system in Picayune.

A MAGNETOMETER

Measures Pipe Line Electric Current

By DAVID HENDRICKSON

D. HENDRICKSON

It has long been the desire of pipe line maintenance engineers to have a satisfactory instrument for making earth surface measurements of the current flowing in underground pipe lines in order to avoid the expense and difficulty of excavations. Numerous technical and practical difficulties have, heretofore, been encountered when such surface measurements have been attempted. The following excerpts from the paper, "Measurement of Electric Current on Pipe Lines Using a Magnetometer," which was presented by David Hendrickson, East Bay Municipal Utility District, Oakland, Calif., at the 47th Annual Convention of the Pacific Coast Gas Association in Coronado, Calif., September 18-20, 1940, describe briefly an instrument adapted from magnet geophysical prospecting use that is, apparently, new in the pipe line engineering field. Despite possible limitations to its use, the instrument deserves careful consideration. Mr. Hendrickson is a well-known figure in the gas industry whose duties with the East Bay Municipal Utility District have included the installation and testing of electrical equipment. In 10 years with the Pacific Gas & Electric Co. he was variously engaged in the power house and substation operation and maintenance department, the construction department, and the engineering department.

IN connection with the cathodic protection of large diameter underground water pipe, it was desired to ascertain the distribution and flow of protective current, by earth surface measurements, without the use of electrical connections to the pipe, or excavations for earth current meter readings. Experiments with a magnetic dip needle indicated that the magnetic field near the pipe line is proportional to the current flowing in the pipe. This instrument is not sufficiently sensitive to make accurate determination of the field strength to evaluate current intensities. It was obvious that if this deflection could be accurately determined through amplification it would provide a valuable means for determining current intensities without the necessity of a large outlay in preliminary work.

Magnetic prospecting is a familiar geophysical method and a variety of instruments have been developed for the purpose. The vertical magnetometer, which measures the vertical component of the earth's field, is considered to be the most sensitive and practical for facility of operation, and is readily adaptable to the work at hand.

The instrument consists of a balanced magnetic system mounted on an agate knife edge. The deflections are measured by means of an optical system. Fig. 1 shows a schematic diagram of the assembly.

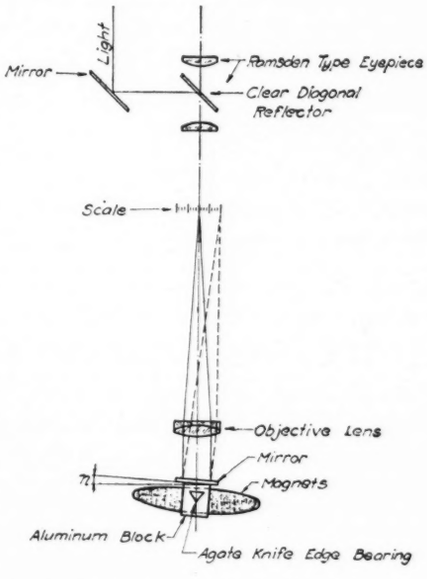


FIG. 1. Schematic diagram of magnetometer.

Light is reflected from the upper mirror to the clear glass plate mounted at 45°. The pencil of light passes through the graduated scale to the mirror mounted on top of the magnetic system and is reflected back to the eye piece.

One scale is seen directly and the other is seen reflected. It is obvious from the diagram that the deflection is greatly amplified by this method.

A more detailed description of the instrument is given in "Geophysical Prospecting," also "Terrestrial Magnetism and Electricity."*

The magnetic field along the pipe, produced by the protecting current, is superimposed upon a magnetic field due to the earth's magnetism and possibly other undetermined causes. In employing the magnetometer to determine the current values flowing in the pipe, it is necessary to separate the magnetic field produced by this current from the unknown factors. These unknown quantities are relatively constant for short intervals of time.

The procedure devised consists of first measuring the field strength with the protective current shut off and in the same set-up to immediately measure the field with the current flowing, the difference thus obtained being interpreted as an indication of current flow. The protective current was interrupted for one minute in three by means of an automatic interrupting switch, thus enabling the work with the magnetometer to be carried on continuously. The earth's magnetic induction along the pipe line may vary considerably, but the decimal variations are negligible in so short an interval of time. The average of a number of readings at each set-up eliminates any error from this source.

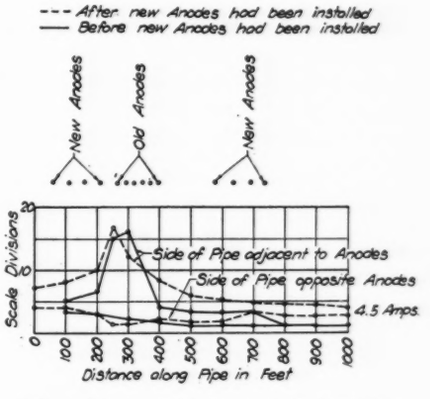


FIG. 2. Magnetometer survey in the vicinity of Cathodic Station No. 13. East Bay Municipal Utility District, Oakland, Calif.

By proceeding along the pipe making these measurements at regular intervals the change in current can be computed and points of excessive pick-up or loss noted.

In connection with this it is necessary to determine the location of the center line of the pipe and the depth

*Geophysical Prospecting—Transactions A.I.M.E., Vol. 110 (1934) Page 334.
Terrestrial Magnetism and Electricity — (Page 121), J. A. Fleming, Carnegie Institute, Washington, D. C., published by McGraw-Hill Book Co.

to the top of the pipe in order to orient the magnetometer and compute the height of the instrument above the pipe. The magnetometer was set up each time 15 ft. to one side of the center line.

A survey in the vicinity of Station Number 13 (see Fig. 2) with the magnetometer showed that a high percentage of the current flowed to the pipe opposite the anodes, leaving very little for distribution to other points along the line. The heavy adobe soil had broken the coating to such an extent that large areas of bare steel were exposed to the soil, permitting the concentration of current. By installing additional anodes at some distance (along the pipe) a more even distribution was obtained.

Measurements at several stations with the magnetometer have shown that the flow of current on the side of the line adjacent to the anodes is several times that on the opposite side, particularly in the vicinity of the station. Future practice will be to install anodes on both sides of the pipe.

In addition to making measurements of changes of field strength along the line, tests were made to evaluate the deflections of the magnetometer.

It is necessary to use values determined by these calibrations rather than to rely upon the basic equation which is based upon the magnetic field surrounding a straight conductor of infinite length and negligible cross section. The computed results and measured quantities do not agree.

Curves were plotted from data obtained by observing the magnetometer deflection when current of known value was flowing in the pipe at three locations. The current was obtained from a storage battery and applied to the pipe by making cable connections 1000 to 2500 ft. apart. The cable loop was kept 300 ft. or more away from the pipe and instrument. An average of all of the data indicates that a value of 1.17 amperes per unit of scale deflection may be used throughout the aqueduct with negligible error.

117-Mile Line Augments Columbia System

By E. D. CLUTTER

Superintendent of Transmission, The Manufacturers Light and Heat Co., Pittsburgh, Pa.

RECENTLY completed are 117 miles of new pipe line, constructed by the Manufacturers Gas Co., the Manufacturers Light and Heat Co., and the Pennsylvania Fuel Supply Co., all Pittsburgh subsidiaries of the Columbia Gas and Electric Corp., of New York. Part of this new construction, tied in with pipe lines already laid, will greatly improve Columbia's pipe line system extending to the Pennsylvania-New York state line near Olean, N. Y. The new pipe line system will carry 2,500,000,000 cu. ft. of natural gas annually to consumers for the next 15 years. Gas for the new line is to come from West Virginia and is to replace the rapidly diminishing source of supply in New York State. The estimated cost of the line will be approximately $1,800,000. The line will extend through Western Pennsylvania from Monaca, Pa., near Beaver and Rochester to the New York state line at Knapp Creek (between Bradford and Olean).

Williams Brothers Corp. of Tulsa, Okla., was awarded the contract covering the construction of the pipe line, while Pritchard & Co. of Kansas City, Mo., was given the contract for the construction of two new compressor stations of 1000-hp. each.

A short summary of the work that was done by each of the companies above mentioned, the type of construction, materials and equipment used, and a few of the construction problems encountered follows.

Pennsylvania Fuel Supply Co.— This company constructed approximately 12 miles of 10-in. I.D. composite pipe line extending from its Rimersburg Compressor Station, located at Rimersburg, Pa., eastward to Truittsburg, Pa., where it connects with new construction of the Manufacturers Gas Co.

It was also necessary to revamp the Rimersburg Compressor Station because of the fact that this station would be called upon to make deliveries against higher pressures, which meant a change of compressor cylinders, changes to yard piping, additional cooling equipment, etc.

Manufacturers Gas Co. — This company constructed approximately 16 miles of 10-in. I.D. composite pipe line beginning at Truittsburg, Pa., and extending to its Iowa Compressor Station near Brookville, Pa., and approximately 71 miles of 8-in. solid welded line from Iowa Station north to the Pennsylvania-New York state line south of Olean, N. Y., where a connection was made with a new line of the Home Gas Co., also a subsidiary of Columbia Gas & Electric Corp.

The 16 miles of 10-in. pipe line construction was of composite type, the sections of welded pipe varying from four to six joints before installing a coupling. This section of new line was also treated where soil tests showed that treatment was warranted or where the excavated trench showed coal blossoms, bad soil, sulphur conditions, etc.

The second compressor station was erected beside this company's present Iowa Compressor Station and consists of two 500-hp. Clark Brothers units, with compressors capable of 800 lbs. maximum discharge pressure.

Fabricated fittings, bends, tube turns, etc., were used on the high pressure station, as well as Merco-Nordstrom valves throughout the entire job.

The 71 miles of 8-in. line was solid welded and expansion and contraction was provided for by slacking or curving the line in the trench. The terrain traversed by this line is extremely wooded and rocky, and proved to be a real test for some pieces of equipment used by the contractor. Lack of roads along the right-of-way made it often necessary to clear the ground and build a road to the right-of-way in order to facilitate the stringing of the pipe. In some cases it was necessary to use tractors to tow truck after truck over long distances of the right-of-way. Williams Brothers Corp. had four complete gangs working and employed over 1000 men on the project. Much of the pipe line equipment such as ditching machines, back hoes, air compressors,

bull-dozers, etc., were kept on a 24-hour schedule in order to meet the date of completion.

In the vicinity of Bradford, Pa., the new line cut through the heart of the old Bradford oil field which is now a maze of oil, water, gas, air, and rod lines which were a seemingly never ending worry to the contractor.

The 8-in. line was primed, enameled, and wrapped throughout its entire length and where possible a painting and wrapping machine was used to speed up the painting operation.

Since the 8-in. line will operate under comparatively high pressures, and since it traverses a thickly wooded area where acids are prevalent, it is believed that the additional protection secured by coating and wrapping the line will prove a practical expenditure in years to come.

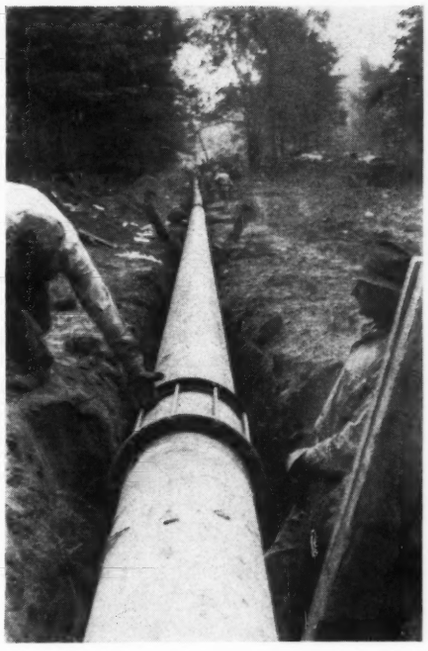
From Rimersburg, Pa., to the New York state line the new pipe line parallels another system of lines owned by the Pennsylvania Fuel Supply Co. and the Manufacturers Gas Co. and at strategic points, connections were made between the new and old lines for the betterment of service to consumers in northen Pennsylvania.

The Manufacturers Light and Heat Co. — This company constructed 12 miles of 16-in. O.D. pipe beginning at their present Monaca Reducing Station located at Monaca, Pa., and extending to a point near Ellwood City, Pa., where a 1000-hp. compressor station was erected.

From the compressor station, a 12-in. line was constructed for a distance of approximately 6 miles north where a tie-in was made with a 10-in. line owned by this company which extended in an easterly direction to Rimersburg, Pa., and here new construction began again on the Pennsylvania Fuel Supply Co.

Of the 12 miles of 16-in. line constructed by this company, approximately 2½ miles were through the boroughs of Monaca and East Rochester which necessitated the cutting of considerable pavement, the crossing of many railroad rights-of-way, some of which were quite lengthy, and the installation of a multiple pipe line across the Ohio River, 1700 feet in width and 28 ft. in depth at the deepest point encountered.

The 16-in. pipe through the Boroughs mentioned was mill coated, by the General Paint Corp., as well as the 10-in. and 12-in. pipe used in the river crossing. All pipe was ordered in double random lengths, with ends beveled 30 degrees to facilitate welding, and then two or three 40-ft. joints, depending upon conditions, were welded together and a pipe coupling was installed.



View of pipe line through New York State, showing rough terrain traversed.

Pipe for the new line was purchased from Jones and Laughlin Steel Corp., National Tube Co., Republic Steel Corp., and Youngstown Sheet & Tube Co. Couplings used on the composite lines were purchased from Dresser Manufacturing Co., Bradford, Pa. About 1800 of these were used on the entire job, as well as Dresser River Clamps and Repair Sleeves.

Accurate records of the location of each coupling and weld beneath the streets were made by engineers as the pipe was lowered in the trench in order that they could be definitely located in the future.

A test was made by Columbia engineers to determine the corrosive conditions of the soil along the proposed right-of-way, and where soil rod readings showed a bad condition, the pipe was reprimed with Bitumastic Primer, a coat of XXH Bitumastic enamel was applied, and then wrapped to alleviate soil stresses on the coat of enamel.

The compressor station erected near Ellwood City, Pa., by this company consists of two 500-hp. Clark Brothers gas engines, with angle drive compressors, capable of 350-lb. discharge pressure. Pritchard & Co. had a complete construction crew at each compressor station and had both stations ready to operate at the specified time.

A dehydration plant was also installed at this point and after considerable discussion, it appeared that an Activated Alumina installation would more nearly meet the existing requirements than any other.

The 6 miles of 12-in. line was constructed from used wrought iron pipe which the company had on hand, and composite construction was also used except that welded sections were of course longer than those on the 16-in. section. Again, the 12-in. pipe was treated as outlined above where necessary.

■ ■

Panhandle Eastern May Serve Dow Chemical Co.

Dow Chemical Co. and Panhandle Eastern Pipe Line Co., Kansas City, Mo., have entered into negotiations which, if completed, will greatly increase the natural gas supply to Dow's Midland, Mich., plant. The plant now purchases approximately 3,000,000 cu. ft. of gas per day from the Temple field, Mich., but could increase its consumption to as much as 25,000,000 cu. ft., it is stated, if the gas were available at burner chemical-extraction rates. The nearest tie-in point to Midland on Panhandle Eastern's Michigan gas transmission line is 125 miles distant, which would necessitate the laying of a pipe line of that length.

■ ■

United Gas Pipe Line Co. Extends Lines in Texas

The United Gas Pipe Line Co., Shreveport, La., is constructing 16 miles of 8-in. and 3½ miles of 10-in. line in order to transport natural gas from the Willow Slough, Sea Breeze, and Labelle gas fields of Texas to the company's 18-in. Goodrich main transmission line. The two lines will connect at a point on the outskirts of Beaumont, Texas. Gas from these three fields will supplement the supply now coming from fields in northern Louisiana into the Port Arthur-Beaumont area.

In addition to the lines being constructed, a 10-in. line has been leased from the Yount-Lee Pipe Line Co. and converted from an oil line into a gas line. This line extends from Sea Breeze to within two miles of Beaumont.

■ ■

El Paso Gas Company Serves In Mining

With natural gas as a factor in the development and operation of Arizona mining industry, a 46-mile line from the main artery of the El Paso Natural Gas Co. near Red Rock, in Pinal County, Ariz., serves the smelter of the American Smelting and Refining Co. and the power plant of the Ray Mines Division of the Nevada Consolidated Copper Co. at Hayden, Ariz.

The main system into Arizona was constructed by the Western Gas Co., a subsidiary of the El Paso Natural Gas Co., and the investments of the El Paso Company in Arizona are well past the $5,000,000 mark.

■ ■

23rd A.G.A. Convention Date and Location Set

The twenty-third annual convention of the American Gas Association will be held the week of October 20, 1941, in Atlantic City, N. J., according to an announcement by T. J. Strickler of Kansas City, Mo., president of the Association.

LEFT, above: View showing pipe laid in 40″ by 48″ trench. Workmen are making a canal crossing.

LEFT: These workmen are whitewashing pipe with rag mops to safeguard against effects of the sun.

LEFT: Coated and whitewashed pipe being lowered-in. This 92-mile line will cost about $1,250,000.

LEFT: Coating machine is crossing a small canal. The pipe was specially treated against erosion.

MEMPHIS

Builds 92-Mile Loop Line

THE Memphis Natural Gas Co., of Memphis, Tenn., is now laying four loops of 18-in. main, totaling 92 miles in length, throughout the Delta farm lands in order to prevent a recurrence of the shortage which last winter forced large industrial users of gas to go back to burning oil and the city of Memphis to put back into operation its old and rarely used manufactured-gas plant for the use of domestic consumers. B. L. Johnson is president of the company.

The new line, costing $1,250,000, will be completed early this month, in time to assure against a possible curtailment in service and also to provide an adequate supply of fuel for the growing industrial needs of the section. The work is being done by the N. A. Leigh Construction Co., San Antonio, Texas. The pipe was furnished by Youngstown Sheet and Tube Co.; the protective coatings by Barrett Co.

The 210-mile 18-in. main, built in 1928, with two compressor stations, delivered 60,000,000 cu. ft. a day, and later was increased to a 70,000,000 capacity by the addition of two more compressor stations. It actually delivered up to 72,000,000 cu. ft. at the peak last January.

The 92-mile line now almost completed will raise capacity to more than 80,000,000 cu. ft. on a peak day. The main is being laid in the same right of way with the present pipe, and a 1000-hp. compressor is under construction near the Monroe, La., field where Memphis and part of Mississippi get their fuel.

The Memphis Natural Gas Co. is the transmission agent and purchases the gas from the United Gas Pipe Line Co., owners of the wells. From the wells, drilled to a depth of 2200 to 2300 ft., the transmission lines go off in various directions, like the spokes of a wheel. Six radiating transmission lines serve urban consumers. One line extends north to St. Louis, Mo., another northwest to supply Arkansas, one to the vicinity of Shreveport, La., another to New Orleans, a fifth to Atlanta, Ga., and finally the one northeast to Memphis and West Tennessee.

The gas is delivered to the Memphis

NATURAL

Through Mississippi Delta

Natural Gas Co. at 100 lbs. pressure by the United Company at Guthrie, La., where it is increased to 400 lbs. In 1932, the Memphis line had only one compressing station in addition to the field station at Guthrie. This was located at Benoit, Miss. A few years ago two other stations were added. One was constructed at Wilmont, Ark., and the other was added at Lula, Miss.

The present line passes through the northeastern corner of Louisiana, the southeastern corner of Arkansas, crossing the Mississippi River near Greenville, Miss. From there it runs generally parallel to the Mississippi River to Memphis. The 18-in. main is buried 3 ft. under ground. By the time the gas has arrived at the Wilmont Station, the pressure has fallen to about 250 lbs. There it is increased to 400 lbs. It is "boosted" along at the various compressor stations and is delivered to the Memphis Light, Gas and Water Division at 100 lbs. at a station in Memphis.

The Mississippi River crossing presented many problems. A single line through the river is not deemed ample for safe practice. The Memphis line crossing consists of four 10-inch lines roughly paralleling each other, and joining together in a manifold above the water line on either side of the river.

The river lines do not run directly across the river perpendicular to the banks, but are laid in the form of an arc with the convex side upstream. The idea is that the current will compress the arc, tending to form a straight line, rather than to tear the line apart as would be the case were the convex side downstream. The river lines are weighted and held against the bed of the stream by heavy iron river clamps around the joints of the pipe. These weights, along with the design of the river lines, tend to cause the current of the river to force the lines into the bed of the stream and cover them with silt rather than to tear them apart. Each of the river lines has a valve at either end so that in case it should break, it can be cut out of service and the others used for carrying the gas until the broken line can be repaired.

RIGHT, above: Installing a "River Clamp" and getting ready to lower a Bayou Crossing in water.

RIGHT: Coated and white-pipe hanging suspended over Bayou preparatory to the lowering-in.

RIGHT: The pipe cleaning machine in operation. Notice enamel being stirred in the 500-gal. kettle.

RIGHT: Here the pipe-coating machine is being run over wrinkle-bends, formed when pipe is bent.

All photos courtesy The Barrett Co., New York.

Reforming Natural Gas

By A. M. RADER

Assistant Plant Superintendent, Minneapolis Gas Light Company

A. M. RADER

REFORMED gas is produced when natural gas and steam are passed through the hot fuel bed of a water gas generator. The volume, B.t.u., and specific gravity of the resultant gas depends on the temperature and depth of the fuel bed, the rate of flow and the ratio between steam and natural gas used, states Mr. Rader in the following paper presented before the Mid-West Gas Association School and Conference, held at Ames, Iowa, last November. Mr. Rader, a graduate chemical engineer from the University of Florida and formerly engineer of the Jacksonville (Florida) Gas Co. and general superintendent of the Savannah (Georgia) Gas Co., says, "The object of our operation is to produce a reformed gas without free carbon, that will give a mixed gas of suitable gravity and burning characteristics at the lowest cost per unit of mixed gas." — (Abstract by GAS.)

SINCE 1935 Minneapolis has been supplied with 800 B.t.u. gas. This gas has been produced by mixing 1000 B.t.u. natural gas with 255 B.t.u. water gas. The gas is mixed directly into the city mains at 5 to 10 lbs. pressure with a controlled butterfly mixer.

The natural gas is supplied from the Texas Panhandle field, by the Northern Natural Gas Co., and is purchased by us under contract on a demand and commodity basis. We are subject to set a new demand for five months from November 1 to March 31. We are not subject to set a new demand for seven months from April 1 to October 31, so the cost of additional gas used during this period is only the commodity charge.

Reforming natural gas to reduce the amount of blue gas in the 800 B.t.u. city gas offered good possibilities to reduce the cost of 800 B.t.u. city gas during the seven summer months. Equipment was installed and reforming was started August 22, 1939. The efficiency for reforming has been high and the results in general have been very satisfactory.

Description of Plant

No changes are necessary in standard water gas sets or in standard plants designed to produce carburetted water gas. It is only necessary to pipe and control the flow of natural gas to the machines to reform natural gas.

The Minneapolis plant was designed and built to produce 550 B.t.u. carburetted water gas, and consists of standard equipment and accessories for a plant of this size. There are three 11-ft. sets with back run, and five 11-ft. sets with hot valves. The condensers are water tube type and are located between the machines, and a 250 M c.f. relief holder. The gas is pumped from the relief holder through precipitators, liquid purification absorbers, Napthalene scrubber, oxide purification boxes, and meters. The plant piping and purification system will handle 1000 M c.f. per hour. The purified gas is stored in a 1000 M c.f. holder, and from this holder the gas is compressed and mixed with natural gas to form 800 B.t.u. city gas.

Two 11-ft. machines were equipped for reforming. (See Fig. 1.) They are backrun machines with automatic grates, waste heat boiler, and steam accumulator. The natural gas for reforming is taken from a header at 50 to 60 lbs. pressure through a 6-in. overhead steel line to a 10 x 15 positive displacement meter. This meter has a temperature, pressure, and volume recording chart to measure gas used for reforming. A 6-in. Fisher constant flow regulator with flow control orifice regulates the flow into a 10-ft. diameter, 3000 cu. ft. capacity surge tank.

The constant flow regulator is set to give a constant flow to the surge tank while the pressure in the surge tank varies from 50 to 20 lbs. during each cycle.

An 8-in. regulator on the outlet of the surge tank delivers gas to the machines at 8 lbs. constant pressure. The gas is delivered to the machines through 8-in. pipes and a series of hand and hydraulic valves, designed to give complete control of flow, and a high safety factor.

The first valve is a hand operated Nordstrom cock for positive shut off. The second and third valves are hydraulic operated from the oil lever. The space between these two valves is vented to the wash box, with a 2-in. line and hydraulic valve that opens when the two main valves are closed. The fourth valve is a safety valve that closes when the generator blast valve is open. The line branches with the up run branch going to the bottom of the generator ash cone, and the back run line connecting to the top of the Superheater. Each branch has a hand operated 8-in. gate valve for regulating flow and a hydraulic valve. The up and back run gas valves are connected to the back run lever, and operate the same as the up and back run steam valves. An orifice in the line to each set is connected to an indicating flow meter mounted on the instrument panel. The hydraulic valves are below the operating floor, but flags extend to the operating floor and indicate the position of the valves.

Pyrometers record the temperature in the Superheater, and in the generator two feet below the grates. A Ranerax Specific Gravity recorder gives a record of the specific gravity of the reformed gas. Recording calorimeters give the B.t.u. of reformed, mixed, and natural gas.

Reformed gas is produced when natural gas and steam are passed through the hot fuel bed of a water gas generator. The volume, B.t.u., and specific gravity of the resultant gas depends on the temperature and depth of the fuel bed, the rate of flow, and the ratio between steam and natural gas used.

The amount of steam used is very

TABLE NO. 1.

	%	*Minutes*	*Rate*
Blast	9	.378	16,000 cu. ft. per min.
Blow run	21	.882	10,000 cu. ft. per min.
Up steam run	4	.168	140 lbs. steam per min.
Up steam and gas run	25	1.050	140 lbs. steam and 3500 cu. ft. gas per min.
Back gas run	34	1.428	4800 cu. ft. per min.
Up steam purge	3	.126	140 lbs. steam per min.
Air purge	4	.168	10,000 cu. ft. per min.
	100	4.20	

Total air = 16,540 cu. ft. per run
Total steam = 188 lbs. per run
Total natural gas = 10,533 cu. ft. or 264 lbs. steam equivalent

$$\frac{\text{Cu. ft. air}}{\text{Lbs. steam and gas}} = \frac{16{,}540}{452} = 36.6$$

$$\frac{\text{Cu. ft. natural gas}}{\text{Lbs. steam}} = \frac{10{,}533}{188} = 56.0$$

Make per run = 28.2 M.
Make per hour = 380 M.
Per cent of steam and gas on back run = 38.0

TABLE NO. 2. TYPICAL RESULTS AND ANALYSES OF PLANT OPERATION.

	Average Natural Gas Analysis	*Typical Reformed Gas Analysis*	*Average Mixed Gas From Reformed Gas*	*Average Mixed Gas From Blue Gas*
CO_2	0.2	5.7	1.9	1.5
Ill	0.1	0.9	0.5	0.1
O_2	0.3	0.1	0.3	0.4
CO	0.0	9.7	3.2	8.0
CH_4	74.0	24.3	57.0	54.6
C_2H_6	15.1	0.0	10.0	11.0
H_2	0.0	26.1	9.0	9.6
N_2	10.3	33.2	18.1	14.8
B.t.u. ..	1002.	378.	800.8	803.3
Specific gravity	0.687	.668	0.67	0.68

Average coke analysis (2 x 3 egg coke): H_2O, 0.1; vol. 1.1; F. carbon, 91.7; ash, 7.0; S_2, 0.47.

B.t.u. 12,870 per lb.; fusion point of ash, about 2500° F.

important. If the amount is too low, then free carbon will be carried with the gas, and if the amount of steam is too high, then part of the fuel bed will be used to produce water gas, with loss of efficiency.

The object of our operation is to produce a reformed gas without free carbon, that will give a mixed gas of suitable gravity and burning characteristic at lowest cost per unit of mixed gas.

Coke is used for generator fuel, and the fuel bed is carried as high as possible. The blast rate is run as high as possible without blowing fuel from the generator. The blast pressure under the grates varies from 38 to 42 in. pressure. The temperature of the fuel bed is carried as high as practical without overheating the grates. The temperature 2 ft. below the grates varies from 500 to 700° F., and the top of the fuel bed is a bright cherry red.

The amount of steam used is as low as possible without formation of free carbon in the gas. Tests are made for free carbon with a tar camera at regular intervals. Blow run is used to increase the gravity and decrease the B.t.u. of the reformed gas.

The cycle found most satisfactory, and in use at the present, is shown in Table No. 1. Typical results and analysis are shown in Table No. 2.

After nine months of use the reforming operation has proved satisfactory. All of the equipment, meters, valves, and regulators, installed for reforming, have worked satisfactorily.

Maintenance on the machines has been at a minimum. The sets are fully checkered for producing carburetted water gas, one set with new brick, and one set with old. There has been no sign of wear on the checkers or lining brick. The grates and clinker beams show much less wear than with blue gas operation.

The machines run an average of 300 hours between hand clinkering, compared with 150 hours for coal, and 100 hours with coke, for blue gas production. The clinker beams are run to remove ash with about 15% combustible material.

With blue gas operation the three-way valve would become dirty after 150 hours operation, while in reforming the three-way valves have remained clean, and require inspection only. The wash box on one machine was cleaned after 1000 hours operation, and had only a small deposit of carbon.

When the amount of steam used was too small, there was some hard carbon deposits on the generator walls, but when the steam condition was corrected, the carbon would start to disappear. There have been no noticeable carbon deposits in the carburetor, superheater or connections. With the cycle that is used at present, there are no carbon deposits in the machine, only a trace of free carbon in gas leaving the machine.

The waste heat boiler connected to the machine, is not used while we are reforming as the blast period is short and the blast gases will not burn. The analysis of the gas during the blow, averages 19.6% CO_2, and 0.5% CO. The temperature in the superheater averages about 1000° F., but there is no practical control over the superheater temperature, as no carburetted air is used.

There is a tray type carbon scrubber between the condensers and relief holder, but we try to keep the carbon in the gas going to this scrubber, very low. The scrubber was built for naphthalene removal, but we circulate seal water over the trays, and remove a trace of carbon, and some light tar. The capacity of the carbon scrubber is low, so only 30% of our gas is scrubbed for carbon removal. With proper control of the reforming in the water gas machine, we do not consider it necessary to use any extra equipment for carbon removal. We have found no deposits of carbon in our exhausters, plant piping, or purification equipment.

The precipitators act as a safeguard to prevent carbon from getting to the purification boxes, or the city mains. No carbon has showed up in the precipitators, but a small amount of light tar that is produced from reforming is removed. The H_2S content of the gas is quite low, about 10 grains, and is removed in oxide purification boxes.

Naphthalene is produced while reforming natural gas with coke as a generator fuel, and must be removed from the gas. The naphthalene content at the wash box runs from 30 to 35 grains per 100 cu. ft. This is removed by cooling and scrubbing with oil in a two-pass tray type scrubber. About 0.1 gal. of oil per M is used for scrubbing, and the spent oil is added to the machine through the generator oil spray.

Reforming natural gas is an operation that can be varied to suit almost any need. The B.t.u., gravity, and composition of the gas can be varied over wide limits.

The efficiency of reforming is much higher than the efficiency of blue gas, or carburetted water gas production. The cost of the equipment for reforming is small compared to the savings it will produce.

The economics of reforming depends on the relative cost of natural gas, coke, coal, and oil. The type of gas produced, and equipment costs, can be varied to suit almost any need.

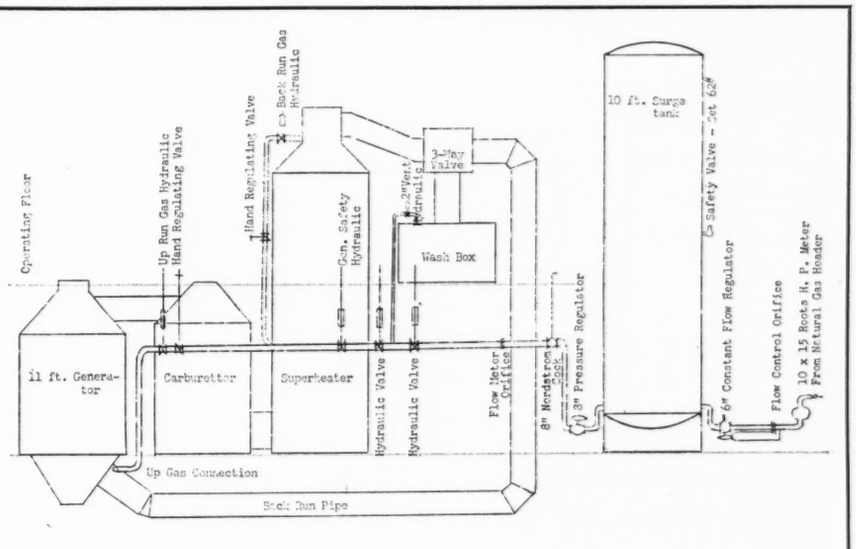


FIG. 1. Equipment for reforming natural gas.

SALES Slants

Gas Goes on the Air

THE radio, we discover from various sources, is becoming an increasingly important factor in gas appliance merchandising.

In New York: Consolidated Edison Co. of New York is on the air for its sixth successive season with the radio show, "Echoes of New York." The show goes on Wednesday evenings, and the permanent cast includes the Edisoneers male chorus, the Gas House Boys, Linton Wells, commentator; Jack Arthur, master of ceremonies; Quiz Master Paul Wing, Kay Lorraine, vocalist, and Joseph Bonime and his concert orchestra. McCann-Erickson produces the show under the supervision of Clarence L. Law, Consolidated Edison vice president.

In Tennessee: "The Melody Lingers On" is a new type of radio program sponsored by the Chattanooga Gas Co. The program is written around moments in the lives of Chattanooga in which music has played a part. Harman I. Moseley writes the original radio script and handles the presentation. To secure his material, Mr. Moseley interviewed 50 Chattanoogans, asking the following question, "If all the music in the world were to be taken away with the exception of one melody that you might choose, what would it be and what part has it in your life?"

In Oklahoma: "The Show of the Week" is the name of the new program recently launched by the Oklahoma Natural Gas Co. over station KOME, Tulsa, and Mutual network stations in Enid, Oklahoma City, Shawnee, and Ardmore. The program will run for 26 weeks, being broadcast each Sunday afternoon from 5:30 to 6:00 p.m. The program originates in New York, and features such radio artists as Vincent Lopez, Abbott & Costello, Martha Raye, Parkyakarkus, George Jessel, Joe Cook, Pic & Pat, Col. Stoopnagle, Billy Gilbert and others. Local officials of Oklahoma Natural make company announcements from the Oklahoma stations connected to the network.

In California: Southern California and Southern Counties Gas Companies have turned to classical music for a two-hour recorded program which is broadcast each night except Sunday from 8:00 to 10:00 p.m. over station KFAC. A typical program takes in Tschaikowsky's "Pathetique" Symphony in B Minor; Debussy's "Iberia," and a recording or two by Kirsten Flagstad.

Programs are scheduled for a full month in advance and are available at all gas company offices. That music-loving Southern Californians appreciate the gas companies' efforts to bring to them their orchestral favorites is evidenced by the fact that each month an average of 12,000 programs are furnished on request. In addition the gas company broadcast has received the whole hearted endorsement of the Los Angeles Board of Education.

■ ■

All-Year Air Conditioning

Many a visitor to the recent South Texas State Fair had reason to pause and reflect as he passed the United Gas Corporation booth. Reason: that progressive Houston Utility had installed and set up in operation a gas-air conditioning unit; proclaimed that the average home could now have all-year air conditioning at a comparatively small increase over the cost of a complete heating installation.

Stated *The Pilot Light*, United Gas Corporation publication: "The All-Year Gas Air Conditioning Unit cools and dehumidifies the air in summer, warms and humidifies it in winter, and circulates and cleans it the year 'round—automatically!"

■ ■

Sales Push

Perhaps you have already noted on these pages the pictures of both "Little Willie" and "Flat-foot McGee." These two unfortunate fellows were among several listed in a booklet, "Candid Snapshots of Salesmen who got 'Took'," published by Belnap and Thompson, a Chicago sales promotion agency, and for them we are much indebted to that firm's vice president, Douglas E. Thompson. Mr. Thompson is kind enough to offer a sample copy of his booklet to any sales executive who may desire it. Belnap and Thompson is located at 309 W. Jackson Boulevard, Chicago.

"Salesmen who got 'Took'," however, is just a part of the Belnap and Thompson story and we turn now to another book, "The Truth About Salesmen," in which it is contended that 20% of the salesmen (the pushers) do 80% of the business, while 80% of the salesmen (the wishers) do 20% of the business. These figures, we are told, are based on a study of the experiences of hundreds of different types of selling concerns. It is Belnap and Thompson's belief that to increase sales something must be done about the wishers. Something has been done and Belnap and Thompson have organized a Hobby Club push plan, publishing each year a beautifully illustrated "push book." The title of the 1941 edition of this book is "Your Prize Opportunity."

■ ■

Onion Pie

One of the pillars on which rests the fame of Martha Holmes (in real life, Karen Fladoes), director for Chicago's Peoples Gas Light & Coke Co., is onion pie. In case you have a desire to rush home tonight and whip up this delectable dish, we give you below the recipe for onion pie.

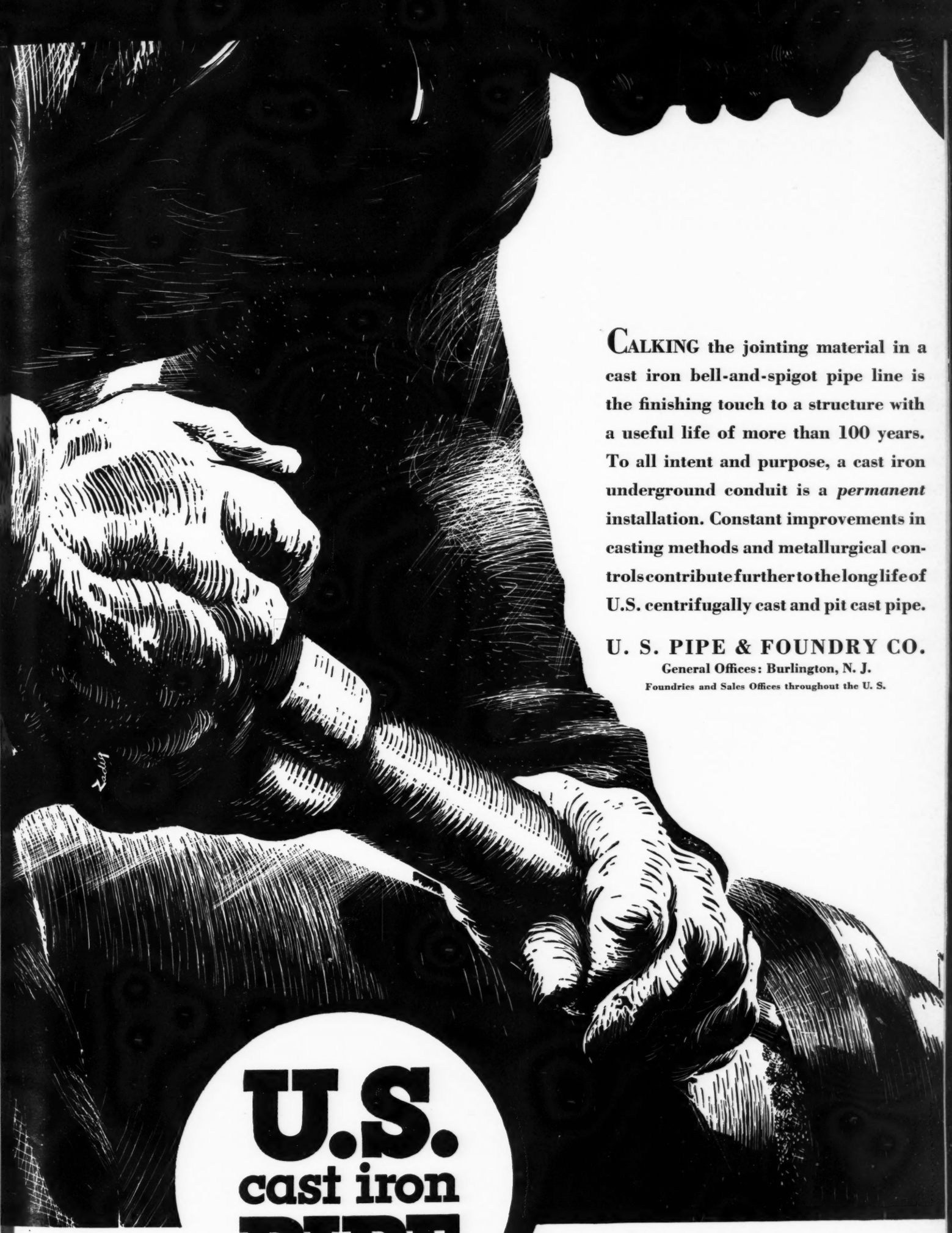
ONION PIE

2 lbs. onions sliced	½ cup sour cream
2 tbs. butter	2 cups flour
½ tsp. salt	4 tsp. baking powder
Dash of pepper	2/3 cup of milk
1 egg	6 tbs. shortening

Cook onions in fat until golden brown. Add salt and pepper. Combine with beaten egg and sour cream. Make bis-

"LITTLE" WILLY . . .

shrinks when face-to-face with hard-boiled prospects. Envies the salesman who is "big enough" to stand up and fight for what he wants, but doesn't have the courage to try it himself. Wonders why his pay check "stays so small."



CALKING the jointing material in a cast iron bell-and-spigot pipe line is the finishing touch to a structure with a useful life of more than 100 years. To all intent and purpose, a cast iron underground conduit is a *permanent* installation. Constant improvements in casting methods and metallurgical controls contribute further to the long life of U.S. centrifugally cast and pit cast pipe.

U. S. PIPE & FOUNDRY CO.

General Offices: Burlington, N. J.

Foundries and Sales Offices throughout the U. S.

U.S. cast iron PIPE

for water works, gas, sewerage, drainage and industrial services.

cuit mix from remaining ingredients and roll out to fit 9 inch pie plate. Fill with onion mixture and bake at 450 degrees for 25 minutes or until lightly browned. Serve hot with pot roast and gravy—serves eight.

This recipe was featured at the six cooking schools conducted last fall by the Chicago utility, under the sponsorship of leading newspapers in various sections of the city. Gathered together in the photo are, standing, Karen Fladoes; tasting, John Pavelka, owner of Johns Restaurant and vice president of the Portage Park Kiwanis Club; watching enviously, Milton J. Levey, manager of the Peoples Gas Light's Irving Park Office. The picture was made by Daniel H. Mowat, of the company's Advertising Department, which is headed by Clayton Cassidy.

The reason for this meeting was the founding of the Irving Park Chapter of the Society for the Perpetuation of Onion Pie. Said Martha Holmes: "The Society is all in fun, but really, onion pie is a delicious dish."

We are brave, and will gladly sample a slice, should one come our way.

■ ■

True Story

The two million readers of *True Story* will find in the January issue a two-page illustrated article, "Makes Good Cooks Better," which, as you have guessed, deals with the modern gas range, CP included. The article appears on pages 98 and 99, and the magazine went on sale November 29. *True Story* has been kind enough to supply the A.G.A.'s Committee on National Advertising with 5000 copies, and A.G.A. suggests that copies of this story be distributed locally by salesmen, home service representatives, and others. Quantity lots are available free of charge, except where individual costs total $1.00 or more, through the American Gas Association, 420 Lexington Avenue, N. Y.

■ ■

Saving With CP

Count de Pennies, standing nearby, is a creation of R. V. Davis of the Southern California Gas Co., Los Angeles. The Count is principal actor in a series of bulletins designed to present to dealers and to salesmen suggested ways of presenting the features of the CP Range as sales material. The Count, an orderly gentleman, restricts each of his bulletins to the discussion of one of the CP Range's major benefits. As an example we present the facts from Bulletin No. 2, which carries the headline "Ohio State University Department of Home Economics Shows 30% Loss of Meat by

"Count de Pennies"

High Temperature Cooking." Graphic illustrations disclose that a 14 lb. roast cooked at 500° F. loses 6¾ lbs.; a 14 lb. roast cooked at 250° F. loses 1⅞ lbs. This bulletin goes on to point out:

> "CP ovens reach and maintain any temperature quickly. The heat control assures exact temperature. Adequate insulation keeps heat in the oven and out of the kitchen. With the new low temperature CP ovens, 'slow roasting' method makes inexpensive cuts of meat delicious and tender — conserves energy building minerals and vitamins, and reduces meat shrinkage to a minimum."

In all the company has produced nine bulletins, one introductory, and eight dealing with the ways in which the CP Range's 22 points mean benefits and savings to the gas consumer. We can well imagine that any salesman would be happy to have such practical information on the CP Range.

Bright Idea

One bright morning Earl L. Doster of the Alabama Gas Co. awoke with a bright idea, bought 50 copies of *The Saturday Evening Post* in which appeared one of American Stove Co.'s Magic Chef Round-up ads, and called up Western Union. In short order 50 of his best customers, doubtless startled by the sudden acquisition of the *Post*, were reading this telegram.

> "WE ARE SENDING YOU THIS POST WITH OUR COMPLIMENTS THOUGHT YOU WOULD BE INTERESTED IN PAGE SEVENTY FIVE STOP WE HAVE BEEN LOOKING FOR YOU TO COME IN DURING OUR ROUND UP AND PURCHASE YOUR NEW CP RANGE OUR PRICES ON NEW CP RANGES WILL NEVER AGAIN BE AS REASONABLE—"
>
> EARL L. DOSTER
> ALABAMA GAS COMPANY

It is our hunch that some of Mr. Doster's customers sauntered down to look over the latest CP models.

■ ■

Seeing Is Believing

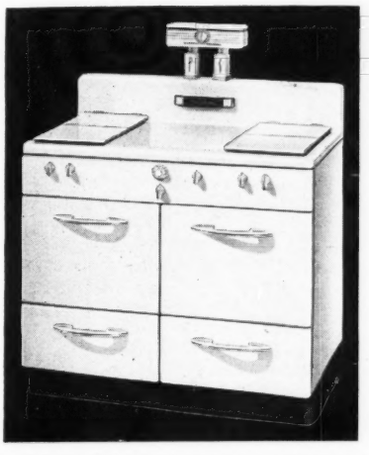
The employes of Seattle (Wash.) Gas Co. will have an opportunity to have their evening meal cooked for them by none other than I. C. McGee, company home service director, for that utility has just decided to hook up one of its visual ovens on the sales floor so that people may know just how perfectly these ovens perform, watch the meats in the process of roasting, see them develop that delicious brown, appetizing color. Says the Seattle Company's "Gasco Newsette," "This is a fine way to have large hams cooked in most delicious manner."

"FLATFOOT McGEE . . .

depends on footwork alone to get results. Never figured that a little extra "headwork" might be better on the "dogs" and would get him a lot of business his competitors are taking away from him every day.

PRE-VIEW OF 1941's

BIGGEST GAS RANGE MONEY-MAKERS



THEY EXPAND YOUR MARKET AND YOUR PROFIT CHANCE

Look well at these pictures. They show three representative models in the Detroit-Michigan Stove Company's Detroit Jewel and Garland Gas Range presentation for 1941.

***All* income groups—*all* price classifications—are completely covered by the Senior, Master, and Pacemaker "41" lines.**

In price, new features, size, quality—every gas range buyer now becomes a prospect for one or the other Detroit-Michigan brand.

The net is simply this: These three magnificent lines expand your potential market. They therefore increase your potential profit.

If this is an interesting picture of 1941—and it should be just that to every merchandising gas company—your next step is to get in touch at once with headquarters—Detroit-Michigan Stove Company, Detroit, Michigan.

DETROIT JEWEL—GAS RANGES—GARLAND

Chef Soulard of the Drake Hotel, Chicago, gives a few cooking pointers to the national winners of the Servel 4-H Club Food Preparation Project as they gather around him in the hotel kitchen.

Servel Awards 4-H Club Scholarships

FOR the sixth consecutive year, Servel, Inc., of Evansville, Ind., manufacturers of the Servel Electrolux gas refrigerator, awarded college scholarships to national winners in the 4-H Club Food Preparation Project, part of the extensive program of the National Committee on Boys and Girls Club Work. Official announcement of the 1940 winners was made in Chicago during the 19th National 4-H Club Congress (Nov. 29-Dec. 7) at a banquet in the Drake Hotel given by Servel in honor of America's outstanding farm-girl cooking champions.

A distinguished audience of men and women prominent in gas industry, governmental, educational and agricultural circles attended the annual banquet at which Jane Tiffany Wagner, director of Servel's Home Economics Department, officiated as hostess, and Grant Fink, Servel regional sales manager in Chicago, was toastmaster.

Among those attending was Bernard T. Franck, vice president of the Milwaukee (Wis.) Gas Light Co., and chairman of the American Gas Refrigeration Committee. Other members of the Committee present were C. V. Sorenson, of the Northern Indiana Public Service Co., Hammond, Ind., and B. H. Wittman, of the Peoples Gas Light & Coke Co., Chicago. F. X. Mettenet, vice president of the Peoples Gas Light & Coke Co., also attended.

This year more than 75,000 girls in 35 states participated in the Food Project. Servel's 4-H Club activity is under the direction of its Home Economics department. Louis Ruthenburg, president of Servel, is a board member of the National Committee on Boys and Girls Club Work.

The six young women, to each of whom Servel awarded a $200 college scholarship are: Edna L. Lavender, 16, of Jefferson, Ga.; Joan V. Taylor, 18, of Adrian, Minn.; Pat Graham, 16, of Fayetteville, N. C.; Dorothy Brusch, 18, of Canby, Ore.; Marion Cottrell, 17, of West Kingston, R. I., and Lillian Pautz, 20, of Horicon, Wis.

Participants in the Food Preparation Project, ranging in age from 15 to 21 were judged on the basis of the most outstanding records made in planning, preparing and serving of food. This included proficiency in balancing budgets and menus, the fine points of purchasing food, and the modern methods of preserving it.

From the many county winners, all of whom received gold medals, state winners were selected. These state winners were awarded by Servel with all-expense trips to the Chicago Congress, where six national cooking champions were chosen.

The Food Preparation Project is conducted jointly with the extension services of state agricultural colleges and the U. S. Department of Agriculture.

■ ■

Gas Industry Supplies Toluol To U. S. Army

The United States Army is purchasing supplies of toluol, the basis of TNT, and storing it at places and in quantities unknown to anyone outside the armed service of the country, according to Alexander Forward, managing director of the American Gas Association. The gas industry, a large supplier of toluol, has turned over to the government a study recently completed of its present and potential production of this valuable defense product.

The gas industry's National Defense Committee, under the chairmanship of George F. Mitchell, of Chicago, has kept itself informed of war conditions affecting the gas industry abroad. This committee has learned that gas holders in the war zones have been struck by bombs without the gas exploding. In such cases either nothing happened or else the gas content peacefully burned until consumed, he said.

■ ■

A.G.A. Announces 1941 Sales Conferences

Announcement has just been received from H. Carl Wolf, president of the Atlanta Gas Light Co. and chairman of the Industrial and Commercial Gas Section of the American Gas Association, that the time and place have been selected for both of the 1941 national A.G.A. sales conferences in the nonresidential bracket. The A.G.A. Conference on Industrial Gas Sales will be held March 13 and 14, 1941, at the Lord Baltimore Hotel, Baltimore, Md. The A.G.A. Hotel, Restaurant and Commercial Sales Conference is scheduled for April 24 and 25, 1941, at the Palmer House, Chicago.

This is the first time that the A.G.A. Industrial Sales Conference has been scheduled on the Atlantic Seaboard.

■ ■

West Michigan Consumers Seeks Ottawa Gas Reserve

The West Michigan Consumers Co. of Muskegon, Mich., has made application with the Michigan Public Service Commission for permission to construct a 6-in. gas line into Wright and Polkton townships, Ottawa County, where there is a gas reserve semiproved, according to the Consumers company. The company has a big industrial gas market in Muskegon which it has been supplying from the Muskegon-Ravenna fields and with gas stripped from Traverse wet gas from the Walker-Tallmadge fields, Kent and Ottawa counties. The proposed line would tie into the main Grand Rapids-to-Muskegon line.

■ ■

Ohio Franchise Granted

A franchise was recently granted to the Arlington Natural Gas Co. of Arlington, Ohio giving them the right to lay mains and to furnish gas to the Village of Arlington, Ohio, for a period of 10 years.

San Francisco Bay Region Utility Rates Lowest

THE California State Railroad Commission, in its 91st annual report to Governor Olson, shows that San Francisco and the Bay region have the lowest combined utility bill of the Nation's major population centers.

Prepared by the commission's engineers was an analysis of the combined gas, electric and telephone bills paid by the average family per month in the Nation's 25 largest centers of population. This analysis showed San Francisco and the Bay area with a combined charge of $7.29 per month for the three utilities, making the area the No. 1 spot in the Nation.

Second on the list was Louisville with $7.79, while the No. 3 city was Los Angeles at $7.93. New York and Boston ranked 24th and 25, respectively, with bills of $13.93 and $14.19.

Taxes of all nature on public utilities have increased to the extent that approximately 20% of the electric bills, 15% of the gas bills and 16% of the telephone bills are taxes indirectly paid by the consumer.

■ ■

Federal Power Commission Denies Rate Reduction

The Federal Power Commission at its meeting today decided that there is insufficient evidence of record, at this time, to support the joint action filed by the Cities of Cleveland and Akron for an immediate order reducing rates for natural gas sold at wholesale by the Hope Natural Gas Co. to the East Ohio Gas Co.

The cities had filed with the Commission on September 23, 1940, their joint motion for an immediate order reducing such rates in the amount of approximately $662,000 per year. In rendering its decision today, the Commission took into consideration the representations made by the cities, the exceptions filed by the Hope company, the State of West Virginia and the Public Service Commission of West Virginia, and the oral arguments presented by all parties concerned before the Commission on November 20, 1940.

■ ■

Natural Gas Section Lays Plans For Dallas Meeting

A recent meeting was held by the members of the Production and Transmission Committees of the Natural Gas Section, American Gas Association, in order to plan the technical part of the program for the 36th annual Natural Gas Convention, according to word from E. Holley Poe, secretary of the section.

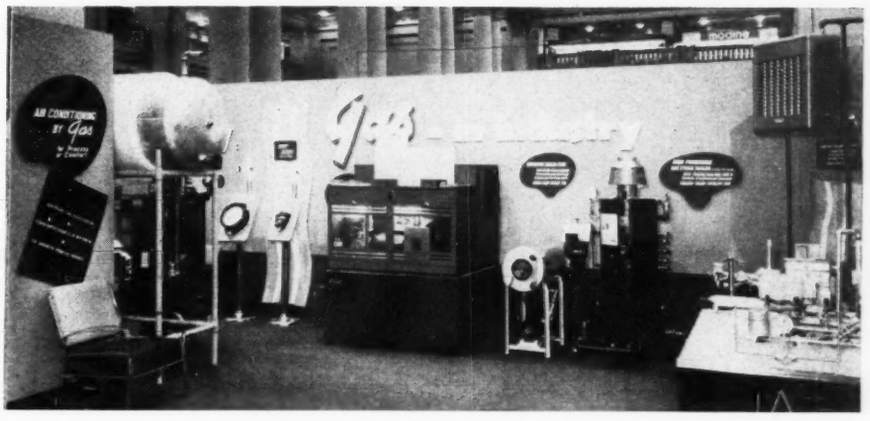
The convention, which will be held in Dallas, Texas, May 5-8, will feature, according to tentative plans, two Production Conferences and three Transmission Conferences, all containing important symposiums and panel discussions.

■ ■

Texas Co. Changes Name

The name of the Southern Union Utilities Co., serving Monahans, Texas, with natural gas for a number of years, was changed recently to Texas Southwestern Gas Co., according to G. D. Webb, local manager.

In that area, Texas Southwestern serves Pecos, Pyote, Barstow, Wink, McCamey and Crane. The company also operates in other parts of Texas and New Mexico.



A view of one of the sections of the A.G.A. Combined Industrial Gas Exhibit at National Power Show, showing the wide range of gas-using apparatus used by industry today.

A.G.A. Combined Exhibit At National Power Show

SPONSORED jointly by the Industrial and Commercial Section of the American Gas Association, The Brooklyn Union Gas Co., and Consolidated Edison Co. of New York, Inc., the A.G.A. Combined Exhibit at the National Exposition of Power and Mechanical Engineering, held in New York, December 2-7, included 30 industrial gas-fired units or pieces of equipment produced by 13 leading manufacturers—the assortment being such that, no matter what were the specific heating needs of the visitor, at least one of the 30 units was designed for the type of job he was interested in. Advanced equipment for heat treating, melting, air heating, dehumidifying, space heating, temperature control, steam generation, water heating, cutting, soldering, gas-air proportioning, forging, and all manner of special applications, was shown.

More than 600 sq. ft. of space were occupied, with 44 ft. of frontage along one of the four major aisles of the main floor area. Commanding orange, with flame designs in brilliant yellow and brown, afforded the color scheme for setting off the equipment shown. The slogan, "GAS in industry," appeared in huge cut-out letters on the backwall, while the familiar trend-chart used in all non-residential A.G.A. advertising was enlarged to giant proportions to emphasize an important sales point on the display side walls.

The A.G.A. committee in charge of the display was chairmanned by John A. Malone, Consolidated Edison Co. of New York, Inc., who was assisted by Carl Wierum, The Brooklyn Union Gas Co., and Harry W. Smith, Jr., American Gas Association. L. G. Barrow, of the display department of Consolidated Edison Co. of New York, Inc., handled the details of booth construction and decoration.

Right to Left: Major Alexander Forward, Managing Director, American Gas Association, New York; Major T. J. Strickler, 1941 President, American Gas Association, Kansas City, Mo.; and Eugene D. Milener, American Gas Association, New York, discuss modern trends in industrial gas equipment at the A.G.A. power show display.

■ ■

Service Commission Okays Richmond Gas Purchase

The public service commission recently approved the purchase of the Richmond, Ind., properties of the Indiana Gas Utilities Co. by the newly formed Richmond Gas Corp. for $550,000. The new Richmond buying company was authorized to issue $149,000 in common stock, $400,000 in first mortgage bonds, and $50,000 each in preferred stock and notes to effect the purchase.

Left to right: C. B. Wilson, Arkansas-Louisiana Gas Co., Little Rock, Ark., and L. L. Baxter, Arkansas Western Gas Co., Fayeville, Ark., president and secretary-treasurer, respectively, of the Southern Gas Ass'n.

Southern Gas Association Lays Annual Convention Plans

UNDER the leadership of C. B. Wilson, president, and L. L. Baxter, secretary-treasurer, complete plans, including a tentative program, have been formulated for the forthcoming Southern Gas Association Convention to be held at the Hotel Adolphus in Dallas, Tex., February 10-12.

As the primary function of the Association's work evolves around sales policies and methods, industrial and technical papers will deal in sales aids and sales slants, attempting to portray to convention members how the technical and industrial phases of the business are affected and affect that important portion of the business.

The tentative speakers for the General Sessions Meeting include President C. B. Wilson; Dean Strickland, United Gas Corp., Houston, Tex.; H. C. Thuerk, general manager of sales, Utility Management Corp., New York, N. Y.; and an inspiration address by D. A. Hulcy, president, Lone Star Gas Corp., Dallas, Tex.

The technical committee program will include addresses by M. S. Bolinger, Arkansas-Louisiana Gas Co., Shreveport, La., who will speak on "The Relation of Proper Venting to Merchandise Sales and Satisfied Customers"; W. R. Nason, General Controls Co., Chicago, Ill., with an address "Gas Actuated Controls"; E. A. Bartolina, Consolidated Gas Utilities, Blackwell, Okla., will present "Simplified Estimates of Gas Engine Power, Requirements and Costs."

On the second day the technical addresses will be: "Sales Results From Company Technical Training of Employes," by E. C. Joullian, Consolidated Gas Utilities Corp., Oklahoma City, Okla.; "The Operating Department and Customer Relations," by C. L. Nairne, New Orleans Public Service, New Orleans, La.; and "Operating Manuals — Their Use and Contents" by a representative of the Oklahoma Natural Gas Co.

The Industrial Gas Sales Conference will include the subject: "Another Year of Gas Air Conditioning," by Elmer May, New Orleans Public Service, New Orleans, La.; "Proper Controls on Industrial Equipment," by I. M. Riles, Wheeler Instrument Co., Greenville, S. C.; "Modern Gas Counter Appliances Are Here," by E. J. Stern, Georgia Public Utilities Co., Atlanta, Ga.; "Some Commercial Gas Sales Problems," by F. M. Chelf, Public Service Co. of Colorado, Denver, Colo.

■ ■

Pacific Coast Gas Association Data Bulletin Winners

The Pacific Coast Gas Association recently announced the winners of the prizes offered the men submitting the most useful articles published in the "Gas Utilization Data Bulletins."

Winner of first prize of $25 for his bulletin, "Comparative Performance Data on Commercial Gas and Electric Ovens," was J. L. Hall, of the Southern California Gas Co.

Other winners were: E. K. Snidecor and Hugh R. Lamberth, Southern California Gas Co.; Fred C. Dietrich and A. J. Perry, Jr, Pacific Gas & Electric Co.

■ ■

Sales Conference Dates Set

The spring sales conference of the Pacific Coast Gas Association will be held in San Francisco on March 6 and 7, according to O. R. Doerr, chairman of the sales and advertising department of the Association.

Gas Appliance Manufacturers To Hold Annual Convention

THE annual convention of the Association of Gas Appliance and Equipment Manufacturers will be held at the Ambassador Hotel, Los Angeles, Calif., June 3-4-5, 1941, according to an announcement by W. E. Derwent, president of the Association.

The Association is comprised of over 300 manufacturers of gas appliances, accessories and equipment from all parts of the country.

Each of the Association's product divisions will meet during the convention under its respective chairman. At these divisional meetings plans for sales promotion activities in behalf of major gas appliances will be discussed as well as the general business conditions of each group.

This will be the first time that the Association has held its convention on the Pacific coast and a record attendance is expected. The manufacturers and gas untilities have done an excellent job of sales promotion on the coast during the past few years in behalf of gas and gas appliances and it was at the invitation of the utilities and manufacturers that the Association's Time and Place Committee finally decided to hold the convention in Los Angeles.

Plans for the convention will be announced at a later date.

■ ■

S.E.C. Considers Restriction On Utility Dividends

Action to restrict the payment of common stock dividends by registered utility companies in order to force upward revision of depreciation accruals and reserves is now being considered by the Securities and Exchange Commission.

Definite recommendations for a rule which would force the utilities to make substantial increases in actual depreciation accruals are now being prepared by the S.E.C. utilities division.

CALENDAR

February

Southern Gas Association — Annual Meeting and Gas Sales Conference, Hotel Adolphus, Dallas, Texas, February 10-12.

March

Spring Sales Conference, Pacific Coast Gas Association — San Francisco, Calif., March 6-7.

A.G.A. Conference, Industrial Gas Sales — Lord Baltimore Hotel, Baltimore, Md., March 13-14.

New England Gas Association — Hotel Statler, Boston, Mass., March 27-28.

April

American Society of Chemical Engineers — Atlanta, Ga., April 1-3.

Southwestern Gas Measuring Short Course — College of Engineering, University of Oklahoma, Norman, Okla., April 15-17.

Missouri Association of Public Utilities — Elms Hotel, Excelsior Springs, Mo., April 23-25.

A.G.A. Hotel, Restaurant and Commercial Sales Conference — Palmer House, Chicago, Ill., April 24-25.

May

A.G.A. Convention, Natural Gas Section — Dallas, Texas, May 5-8.

Pennsylvania Gas Association—Skytop, Pa., May 12-14.

October

23rd Annual Convention, American Gas Association—Atlantic City, N. J., the week of October 20, 1941.

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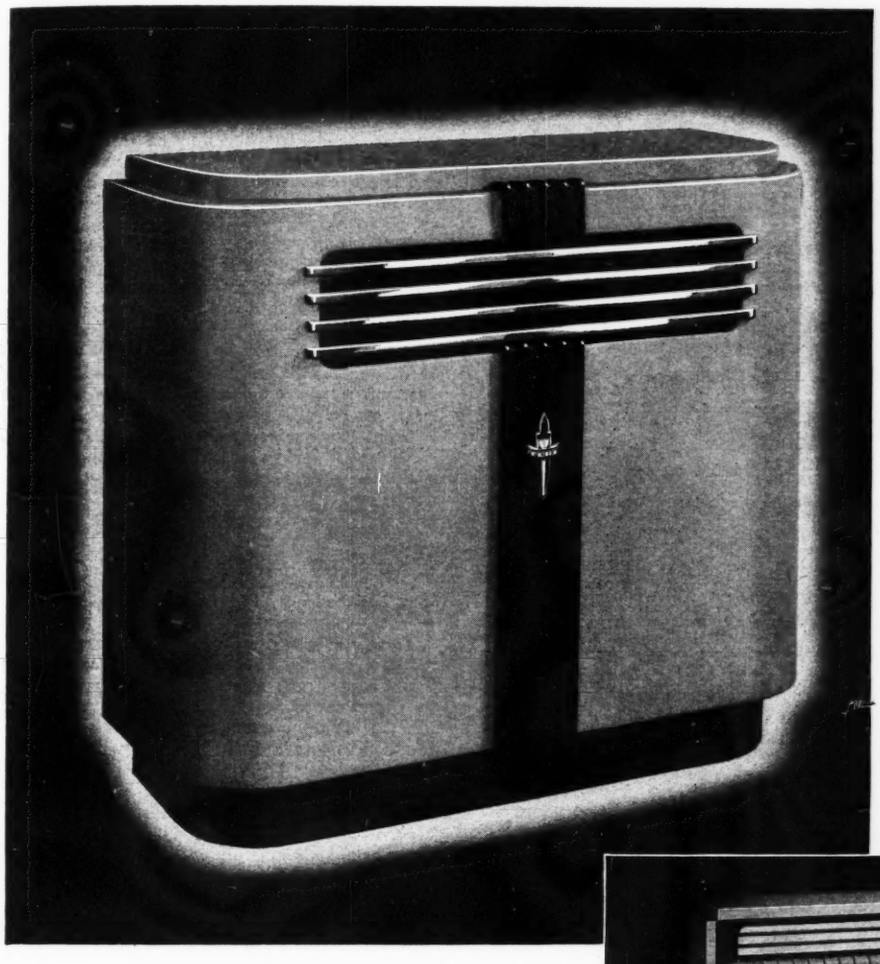
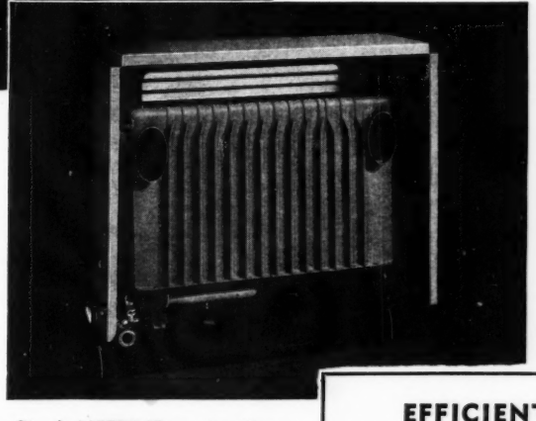
The Masterpiece of Modern STYLING and *Lifetime* CONSTRUCTION





Wedgewood Console Gas Circulating Heaters are true masterpieces of styling, beauty, and construction. Built in three popular and convenient sizes with three lovely color combinations—a soft morocco finish on warm sandtone and seal brown—and a new hammertone finish that gives the appearance of delicately hammered copper.

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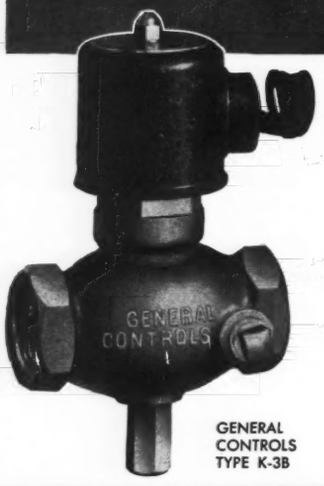

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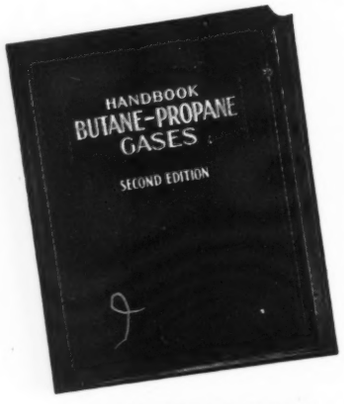

415 Pages

CONTENTS: Semi-Bulk Distribution: Use of Butane in Buses: Combination Propane Operated Utility Plant: Use in Internal Combustion Engines: Design and Installation of Storage: Supply from Petroleum Refineries: Engineering Data on the Lower Olefins: Domestic Appliance Testing and Utilization: Economical Comparisons with Coal, Oil, Electricty, Producer Gas, Manufactured Gas: Town Plants: Manufacture from Natural Gas: Specal Uses: Volume Correction Factors: Transportation: Use with Other Gases: Analysis and Testing: Properties of Mixtures: Bottled Gas Distribution: Bibliography: Central Plant Directory: Catalog Section.

SECOND EDITION (Latest Revision Nov., 1938)

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The Natural Gas Magazine

BUTANE-PROPANE News
1709 W. 8th Street
Los Angeles, Calif.

Hydrogen Sulfide Pamphlet Offered By Mellon Institute

MELLON Institute of Pittsburgh is distributing gratis to interested specialists a pamphlet by J. A. Shaw of its research staff, that describes a method for determining hydrogen sulfide and mercaptan sulfur in admixture in gas.

By this procedure the sulfur is fixed by contacting it with a buffered cadmium chloride solution in a special flask. The cadmium sulfides formed are decomposed in an evacuated chamber with strong hydrochloric acid and the liberated sulfides are treated with a known volume of standard iodine solution in excess. The flask is opened to the atmosphere and the iodine is titrated with thiosulfate. This method is said to insure complete decomposition of the sulfides without loss of volatile compounds; it makes certain that there is contact of the hydrogen sulfide and iodine in a definitely acid solution.

The mercaptan sulfur is represented by the difference between iodine titrations of the total and of the hydrogen sulfide sulfur in samples taken concurrently.

Requests for copies of this publication should be addressed to Mellon Institute, 4400 Fifth Ave., Pittsburgh, Pa.

■ ■

Michigan Consolidated Gas To Reduce Urban Rates

The Michigan Public Service Commission recently ordered the Michigan Consolidated Gas Co., Detroit, Mich., to reduce gas rates to certain consumers in the Metropolitan area. Unless the company appeals the ruling to the Supreme Court, the order will go into effect January 4, 1941.

The estimated reduction will amount to $1,200,000 a year and will affect 400,000 persons, it is said. The reduced rate will affect those consumers using gas for cooking and hot water heating. The annual saving to these users will be approximately $4.68 per year or about 39 cents per month.

■ ■

George D. Roper Corp. Opens Houston Office

J. C. Mansfield, division manager of the George D. Roper Corp., at Dallas, Texas, announces the opening of a branch office and warehouse in the Merchants and Manufacturers Building in Houston, Texas. R. F. Hammack, district manager at Houston, will have charge of the office, and Betty Barker, formerly of Mississippi Power & Light Co., will direct floor sales and manage the office. Storage stock will be carried in the Buffalo Warehouse in the same building. A full stock of gas and butane ranges is now carried at the Divisional headquarters office at Dallas and at Houston.

■ ■

Omaha, Neb., to Enlarge City Gas Plant

The first step toward a project for the expansion of the city gas plant boilerhouse of Omaha, Neb., was taken recently when Metropolitan Utilities directors authorized the hiring of engineering consultants.

General Manager Walter C. Byrne said the boilerhouse proposal, involving a new wing containing two new 500-hp. boilers, has been recommended by district engineers to replace two of six present boilers nearly 50 years old. The project will probably be carried out early this year with an estimated cost of $250,000.

Thumbs up!

WHEN the British were evacuating bombed and flaming Dunkirk, their indomitable spirit, courage and determination were eloquently expressed in a simple, defiant gesture, "thumbs up!" We in America, facing the year ahead with justifiable apprehension, may well adopt this salute and attack our problems of production and supply in the same "thumbs up" spirit. Let us dedicate this year to work. Let us realize that a healthy, active trade with its attendant increases in production and national income is the very foundation of a successful defense effort. And let all who manage or labor in manufacturing plants remember that democracy may *yet* be won or lost on the American assembly line. Whoever we are, let us enter this New Year determined that, with all our resources, and with the examples of Europe before us, our production shall be neither too little nor too late; determined that somehow, regardless of sacrifices, civilization *shall* be kept afloat—and right side up!

1941

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

INDUSTRY *Personalities*

• **A. D. Sutherland,** lately and for some years connected with the company of Lee C. Moore as sales manager for its eastern territory, has been engaged by the Chaplin-Fulton Manufacturing Co. as sales engineer in the marketing of their pressure control equipment.

A. D. SUTHERLAND

Mr. Sutherland is well known to users of such equipment, especially in the oil and gas industries, in which he has been employed since 1910, with the exception of one year spent overseas during the World War. Starting as a tool dresser in Oklahoma, he participated in one capacity and another during the gas boom of the Cleveland field in Ohio and the later one of the McKeesport, Pa., field. He was for a time employed as a salesman for the supply house of Frick & Lindsey, in which connection he made many friends. His new duties with Chaplin-Fulton begin in January.

• Employees of the Hazleton District of the Luzerne County Gas and Electric Corp., Pa., recently presented District Manager **Andrew J. Leib** with a gold wrist watch, marking the completion of Mr. Leib's 25 years with the company. The presentation took place at a dinner attended by 125 employees and guests in Hazleton.

Mr. Leib began his service with the Luzerne company in 1915, as a meter reader. During the World War he served in the U. S. Navy and on his return resumed work with the company. He turned to sales work and has been manager of the Hazleton District since 1928.

• **Mr. A. R. Weis,** president and general manager of the Pacific Pump Works, Los Angeles, Calif., has been elected to the Board of Directors of the Dresser Manufacturing Co., Bradford, Pa., according to an announcement made by **H. N. Mallon,** president.

Mr. Weis has been identified for many years with the development of heavy-duty centrifugal pumps for power plant and oil refineries. He became president of the Pacific Pump Works, a wholly owned subsidiary of Dresser Mfg. Co., October, 1940, after serving as vice president and chief engineer from the company's organization in 1924.

• During the month of December, 1940, two engineers of the A.G.A. Testing Laboratories resigned to take up new duties in the gas industry, and a third resigned to join the United States Army.

Thomas S. Baker's two years experience in testing various types of domestic appliances afforded him an excellent background for his new responsibilities as sales engineer with the W. J. Schoenberger Co. of Cleveland, Ohio, where he began his duties on December 16.

On January 1, 1941, **Chalmers R. Cline** will become associated with the North American Manufacturing Co. of Cleveland, Ohio, in the capacity of sales engineer of the Pittsburgh, Pa., area. Mr. Cline has been in the laboratories' employ for more than 3½ years in the Industrial Gas Research department, and various capacities in the Domestic Gas Research department.

Claude B. McIntosh was also in the laboratories' employ for 3½ years. Following two years in the Research department he was transferred to the Testing and Inspection departments. Mr. McIntosh volunteered to serve with the United States Army and was in the first group of volunteers to be sent from the Cleveland District.

• A year's leave of absence has been granted to **Mr. C. D. Henry,** sales and promotion manager of the Peoria division of the Central Illinois Light Co., to enable him to take a much needed rest.

His duties will be assumed by **R. K. Dallas,** formerly manager of the De Kalb division, who will have the title of Service Sales Manager, in charge of Lighting Sales, Power Sales, Dealer Promotion, Advertising, Gas Sales, Rates, and in general all promotion for new outlets and uses of the company's products, exclusive of Merchandise Sales.

Mr. Glenn Gustafson, who has had 14 years of service in the DeKalb Division, and who has until recently served as Rural Engineer in that division, will assume the managership at De Kalb.

• At a meeting of the board of directors of The United Gas Improvement Co., Philadelphia, Pa., **John E. Zimmermann** was elected chairman of the board and will continue as chairman of the executive committee. As chairman of the board he will be the senior executive officer, having general direction of the business and affairs of the company.

William W. Bodine was elected president and will be the executive officer in charge of the active management of the company.

Mr. Bodine was born in Philadelphia in 1887 and was educated at Harvard University and the University of Pennsylvania Law School. He has been with The United Gas Improvement Co. since 1919, having entered its employ on his return from service overseas. In 1925 he was elected a vice president and in 1934 became executive vice president. In 1932 he was elected a director of the company, to fill the vacancy caused by the death of his father, **Samuel T. Bodine,** president of the company from 1912 to 1926.

• Directors and officials of the B. C. Electric Railway Co., Ltd., gathered in Vancouver, December 19, to honor **Austin T. Goward,** vice president at Victoria, on completion of his fiftieth year with that company.

President W. G. Murrin, in making a presentation to Mr. Goward of a silver tray inscribed with the facsimiles of the signatures of all the directors and officials, drew a picture of Vancouver and Victoria in 1890 when Mr. Goward started with the National Electric Tramway and Light Co., Victoria. Victoria then had a population of 17,000 and mud flats covered what is now the city's finest downtown area.

• It has been recently announced that **Robert Stuart, Jr.,** has taken up duties as general merchandise sales manager with the Blackstone Valley Gas & Electric Co., Pawtucket, R. I., filling the vacancy caused by the recent death of **William E. McCreery.**

Mr. Stuart was previously sales manager for the Fall River Gas Works Co., of Fall River, Mass. He is replaced at Fall River by **H. Vinton Potter,** formerly with the Oklahoma Natural Gas Co. at Tulsa.

• **Rhoades V. Newbell,** formerly associated with the Geo. D. Roper Corp., Rockford, Ill., resigned recently to accept an appointment as account executive with Howard H. Monk and Associates of that city. Mr. Newbell had joined the Roper Corp. advertising staff in 1939, where he edited dealer publications and created complete appliance selling plans for dealers and utilities.

• **J. V. Cowan,** formerly superintendent of the Jal, N. M., treating plant for the El Paso Natural Gas Co., El Paso, Texas, has been transferred to the El Paso office to take charge of the Land and Lease department. He will be assisted by Hart Wood.

Mr. Cowan started work for the El Paso Natural in 1930 in the capacity of chemist. He was made superintendent of the Jal plant in 1936.

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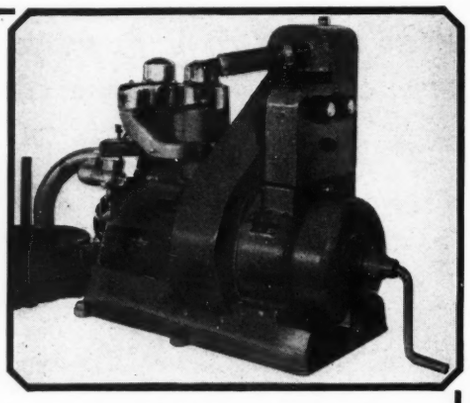

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PIPE LINE DIVISION MINNEAPOLIS, MINN.

• **Harry Siebenthaler,** who has been manager of the Monett group of properties of the Gas Service Co., Kansas City, Mo., since April, 1930, has resigned from the organization to become the distributor of Servel Electrolux gas refrigerators in three counties in southwest Missouri.

Glenn Blauvelt, who has been with the Gas Service organization since September, 1930, working in the Beloit division since 1937 as the new business representative at Ellsworth, will succeed Mr. Siebenthaler as manager of the Monett group.

• **J. R. A. Hobson, Jr.,** director of public utilities for the City of Richmond, Va., was elected president of the Mid-Southeastern Gas Association at the organization's second annual meeting held recently at Raleigh, N. C.

Other officers elected were: **Ralph H. Fry,** of Raleigh, N. C., first vice president; **E. J. Meade,** of Roanoke, Va., second vice president, and **Edward W. Ruggles,** of the N. C. State College Extension Division, was again named secretary-treasurer.

• The transfer of **Don S. Kennedy,** eastern division auditor for the Oklahoma Gas and Electric Co., from Muskogee to Oklahoma City, was announced recently by **J. F. Owens,** president of the company. The transfer constitutes a promotion for Kennedy, who will assume an executive position in the accounting department of the general offices of the company at Oklahoma City.

Mr. Kennedy will be succeeded in Muskogee by **Frank A. Walgren,** of the general accounting department at Oklahoma City.

• **Dr. William R. Hainsworth,** vice president in charge of engineering of Servel, Inc., was elected a vice president of the American Society of Refrigerating Engineers at the final session of the society's annual convention held in New York.

Dr. Hainsworth's contributions in the development of the Servel Electrolux gas refrigerator gained for him many honors, among them the Charles A. Munroe Award granted annually by the American Gas Association.

o **Edward A. Sheehan** and **Frank C. Rutledge,** both of the Cincinnati Gas and Electric Co., Cincinnati, Ohio, were recently tendered anniversary luncheons marking their 25th year with the company. Mr. Rutledge is now assistant director of insurance, while Mr. Sheehan is assistant supervisor, credit and collections.

The resignation of **Perry E. Arnaud,** field supervisor, heating sales, of Cincinnati Gas and Electric, to take a position with the Everhot Water Heater Co., has necessitated several changes in the supervisory personnel of this department. They follow, as announced by Manager **Edwin R. Rothert:**

John M. Jervis, field supervisor, Middletown division, to field supervisor of Cincinnati.

Richard J. Stall, field supervisor, Northern Kentucky, to field supervisor of Cincinnati.

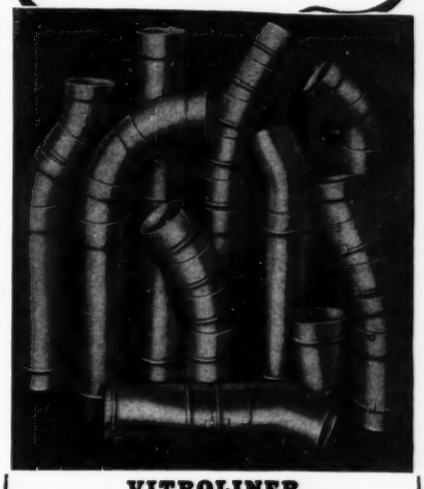
Earl E. Flint, industrial gas sales engineer, Industrial Gas Sales Division, to field supervisor, Middletown division.

Edward J. Reul, special heating salesman, New Homes Division, to field supervisor, Northern Kentucky.

• **E. E. DeBack** of the Coastal Recycling Corp., Corpus Christi, Texas, was recently elected president of the Coastal Recycling Association at the permanent organization meeting held in Kingsville, Texas.

Dr. O. L. Roberts, director of research of the Atlantic Refining Co., Philadelphia, was elected vice president, and **Prof. R. L. Peurifoy** of Texas A. & I. was named secretary-treasurer.

ELIMINATE CONDENSATION TROUBLE



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New Construction Methods Proved By Lacy

Lacy's new construction methods saved time and money on this 4,000,000 cubic foot job, which consists of eight tanks, 32 feet in diameter by 215 feet over all. For the first time, on a field-erected job of this magnitude, steel cylinders were assembled at the job on rollers. The entire vessel is rolled to permit welding in down hand position—effecting great saving in welding costs, insuring better welding, and eliminating most scaffolding. Similar installations are now in progress at El Monte and March Field, California.

EIGHT HORIZONTAL HIGH PRESSURE GAS HOLDERS COMPLETED DURING 1940 FOR THE SOUTHERN COUNTIES GAS CO. AT SANTA MONICA, CALIFORNIA

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• The National Association of Manufacturers' sponsored National Industrial Council officers for 1941 were elected recently at the Council Annual Meeting at the Waldorf-Astoria Hotel prior to the opening of the 45th Congress of American Industry.

The officers for 1941 are:

National Manufacturing Trade Group — Chairman: **V. P. Ahearn,** Executive Secretary, National Sand & Gravel Association, Washington, D. C.; Vice Chairman: **Harry B. Lindsay,** Grinding Wheel Manufacturers Association, Worcester, Mass.

State Associations Group—Chairman: **Roy F. Williams,** General Manager, Associated Industries of Massachusetts, Boston, Mass.; Vice Chairman: **E. A. Kimball,** Iowa Manufacturers Association.

Industrial Relations Group — Chairman: **Colonel Wm. Frew Long,** General Manager Associated Industries of Cleveland, Cleveland, Ohio; Vice Chairman: **A. E. McClintock,** National Founders Association, Chicago, Ill.

• Announcement has been made of the transfer of **Glen Blauvelt,** formerly manager of the Ellsworth, Kan., office of the Gas Service Co., of Topeka, to Monnett, Mo., where he will assume the duties of district manager.

Alvin Deschner, salesman at Osborne, Kan., is to be manager at Ellsworth, which serves five towns in that locality.

• **John E. Lawson,** vice president and general manager, Canadian Niagara Power Co., Ltd., Niagara Falls, Ontario, recently celebrated his 25th year in the service of that concern.

• According to an announcement by **R. H. Hargrove,** vice president of the United Gas Pipe Line Co., **Walter H. Spears,** Houston district manager, was appointed head of the geological department of the general office of the affiliated Union Producing Co. in Shreveport, and **E. M. Smith** of Shreveport, chief dispatcher and superintendent of the telephone and telegraph department in the general office, has been named district manager at Houston. replacing Mr. Spears.

• Announcement has recently been made of the appointment of **James B. Sayers** as chief counsel of The Peoples Natural Gas Co., Pittsburgh, and its affiliates, succeeding **Edward M. Borger,** recently elected president of the company.

Mr. Sayers became associated with Peoples Natural in 1935 as an attorney, a position he held until his recent elevation to the position of chief counsel.

• **George Frederickson,** vice president of the Oklahoma Natural Gas Co., Tulsa, Okla., was elected president of the Mutual Savings and Loan Association at a recent meeting of the board of directors. He fills the vacancy caused by the death of **R. F. J. Williams,** who also was president of the Oklahoma Operating Co.

• **Bruno Rahn,** president of the Milwaukee Gas Light Co., Milwaukee, Wis., has been elected a director of the American Gas Association for a one-year term.

• **C. L. McGee** of Fayette, Mo., is the new district manager of the Central Distributing Co. He takes the place left vacant by K. L. Handley of Windsor, Mo., who has accepted a position in Illinois.

• Announcement was recently made of several changes in the executive personnel of the Consolidated Edison Co. of New York, Inc.

William Cullen Morris, vice president in charge of gas operations, who has passed the company's retirement age was relieved of administrative duties. He will act as consultant on special assignments from the president. Mr. Morris is particularly well known in the gas industry for his long and useful career in this field.

Hudson R. Searing, engineer of operations in the electric field, became vice president of gas and electric operation and of electric production. **James F. Hunter,** assistant vice president, who is president of the Society of Gas Lighting, became vice president in charge of technical service and gas production. **Leland B. Bonnett,** engineer, design and planning, became vice president in charge of design, inventory, purchasing and stores.

Six new assistant vice presidents were elected: **Harland C. Forbes, Porter C. Savage, James F. Fairman, George L. Knight, Earl L. Griffith,** and **Colin C. Simpson.**

• **E. F. Monroe,** formerly smoke abatement engineer for the city of Asheville, N. C., has just been appointed smoke abatement engineer for the City of Charlotte, N. C. Mr. Monroe was the former plant superintendent of the Durham Gas Co., Durham, N. C.

• **Jack Torbert,** business manager of the Wyandotte County Gas Co., a subsidiary of the Gas Service Co., Kansas City, Mo., is now a full-fledged pilot. Mr. Torbert took up flying in earnest last June, and passed his final flight test early in December. He holds a private pilot's license.

• **Mac Young** has been transferred by the Community Natural Gas Co. to Wichita Falls, Texas, where he will be assistant warehouse foreman of the company office. Mr. Young has been associated with the Frederick, Okla. branch of the company for the past two years.

• A surprise luncheon was held recently by associates of **W. H. Lemons,** in honor of his service record of 34 years with the Central Illinois Light and affiliated companies. Mr. Lemons became assistant secretary and assistant treasurer of Central Illinois in 1933, and has lately had his headquarters at Peoria, Ill.

• **A. S. Johnson,** president of the New Mexico Eastern Gas Co. of Carlsbad, N. M., recently informed **J. D. Jackson,** Portales, N. M., manager for the company, that word had just been received from the University of Kansas signifying that the latter had satisfactorily completed the university's "Home Study Course on Natural Gas."

Mr. Jackson has been in the employ of the Southern Union Gas System since 1935 and has been manager of the New Mexico Eastern Gas Co.'s Portales office since February, 1936.

• **Foster Denny,** superintendent of the gas department of Las Cruces, N. M., for the past several years, has resigned and accepted the superintendency of the gas appliance and sales service of the A. R. Ruiz and Son Plumbing Co.

John Ruiz, manager of the Ruiz company, is adding the new department because of the availability of Mr. Denny.

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OBITUARIES

A. B. Groesbeck

A. B. Groesbeck, vice president and general manager of United Gas Corp., Houston, Texas, died November 30 at Locust Valley, Long Island, N. Y., after a brief illness.

Mr. Groesbeck left Houston nearly two months ago on a trip east, where he was taken ill. He was removed to the home of his brother, C. E. Groesbeck, chairman of the board of Electric Bond and Share Co. of New York City, and remained there until death came.

A native of Michigan, Mr. Groesbeck spent his life in the public utility business. He went to Houston about five years ago to take charge of personnel work in the former United Gas Public Service Co. In the summer of 1937, he was elected vice president and general manager of United Gas Corp. in charge of the operating division, which position he held at the time of his death.

■ ■

Paul A. Ryan

Paul A. Ryan, chief statistician of the American Gas Association and head of the Association's statistical staff since 1927, died suddenly in his home, New York, December 25. A large delegation of the headquarters staff and many friends attended funeral services in St. Boniface church, New York, December 28. Burial was in Susquehanna, Pa.

Prior to joining the American Gas Association, he served a year on the staff of the chief statistician of the American Telephone & Telegraph Co., New York, preparing forecasts of general business and economic conditions to be used as a guide for the management of the various Bell System Companies.

On July 1, 1927, Mr. Ryan joined the A.G.A headquarters staff to organize and develop the Statistical and Rate departments. He had served continuously in the capacity of chief statistician ever since.

■ ■

George Dutton Watrous

George Dutton Watrous, a director and vice president of the New Haven Gas Light Co., New Haven, Conn., died recently at the age of 82.

Mr. Watrous was elected vice president of the New Haven company in 1911, and had been a director of the company since 1889, having served more than 50 years in the latter capacity.

■ ■

Leon B. Eichengreen

Leon B. Eichengreen, vice president of the Philadelphia Electric Co. in charge of gas operations and properties, died recently following a brief illness. He was 56 years of age.

Mr. Eichengreen was a director of the American Gas Association as well as a past-president of the Pennsylvania Gas Association.

■ ■

Mahlon Ernest Newlin

Mahlon Ernest Newlin, former manager of the commercial department of the San Joaquin power division of the Pacific Gas and Electric Co., at Fresno, Calif., died in a San Mateo hospital on December 17. He was 62 years old.

TOP PERFORMANCE

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Developed in the famous PAYNE Testing Laboratory, the PAYNE "A" Vent is our answer to the demand of gas engineers for a perfected vent. You owe it to your reputation to install PAYNE "A" Vent on every space heating job.

ADVANTAGES OF PAYNE "A" VENT

1 FAST HEATING: Aluminum inner-stack heats faster than any other common metal. Creates proper draft conditions rapidly.

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You Take No Chance on "Clevelands," for They Are Sold on a Guaranteed Satisfaction Basis.

THE CLEVELAND TRENCHER COMPANY
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Utility Refused Exemption As Holding Company

THE Cities Service Co., of New York, N. Y., was held subject to the Public Utility Holding Company Act by the Securities Commission recently, raising the prospect that it might have to split up its vast petroleum and utility interests into two separate companies.

Cities Service, which has voting power in 110 corporations with more than $1,150,000,000 of assets, had applied for exemption from the act, but the commission denied the application in an order effective January 16.

The company had asked exemption on the ground that it was only incidentally interested and did not derive a material part of its income from utility interests, since its main business concerned petroleum and petroleum products.

■ ■

Oklahoma Utilities Ass'n Elects New Officers

Officers of the Oklahoma Utilities Association were elected and plans for the next annual convention were made, at a meeting of the board of directors of the organization in Tulsa, Okla., December 5.

New officers are: President, R. K. Lane, president, Public Service Co. of Oklahoma, succeeding Frank B. Long, Tulsa; First Vice President, W. L. Woodward, president, Zenith Gas System, Inc., Alva; Second Vice President, J. C. Happenny, president, Oklahoma Power and Water Co., Sand Springs; Treasurer, B. M. Lester, vice president and treasurer, Oklahoma Gas and Electric Co., Oklahoma City; Secretary, Kate A. Niblack, Oklahoma City, re-elected.

New members of the board of directors for the coming year, chosen at the Tulsa meeting, are: J. P. Arnold, Public Service Co. of Oklahoma, Tulsa; E. C. Joullian, president, Consolidated Gas Utilities Corp., Oklahoma City; Frank B. Long, vice president, Oklahoma Natural Gas Co., Tulsa; S. I. McElhoes, vice president, Southwestern Light and Power Co., Chickasha; A. F. Potter, manager, The Gas Service Co., Bartlesville; Mr. Woodward and Mr. Happenny.

Holdover directors are: C. A. Breitung, Oklahoma manager, Southwest Natural Gas Co., Ada; George A. Davis, vice president, Oklahoma Gas and Electric Co.; Glenn C. Kiley, manager western division, same company, and Mr. Lane.

Tulsa, Okla., was selected as the place for the next Annual Convention of the Association, to be held March 17 and 18, 1941. The general convention committee to make arrangements for the meeting is: W. L. Woodward, chairman; J. C. Happenny, Glenn C. Kiley, Paul K. Sticelber and William H. Bagley.

■ ■

Ruud Manufacturing Co. Holds Product Preview

For gas utility executives in Greater New York and vicinity, the Ruud Manufacturing Co. will hold a preview of 1941 products and promotion at the Waldorf-Astoria Hotel in New York City. Dates are January 14, 15 and 16. A similar showing will be held in Chicago in February.

Pacific Lighting Absorbs Industrial Fuel Supply

A CONSOLIDATION was effected December 10 between Pacific Lighting Corp., San Francisco, and Industrial Fuel Supply Co., a subsidiary of the former company. LeRoy M. Edwards, vice president and general manager of Pacific Lighting Corp., stated that this move conformed to the Pacific Lighting Corp.'s policy of simplification of corporate structure, and to effect economies in operation.

L. M. EDWARDS

The executive staff of the Pacific Lighting Corp. as now constituted following some adjustments in connection with the merger stands: Chairman of the board of directors, C. O. G. Miller; president, Robert W. Miller; vice president and general manager, LeRoy M. Edwards; vice presidents, Robert A. Hornby, D. G. Volkmann and Bernard W. Ford; treasurer, G. A. Gillin; secretary, A. T. Wilson; assistant treasurer, A. Black; assistant secretaries, W. M. Fowden and A. Black; controller, C. E. Pearman; superintendent of operations, S. W. Todd; assistant superintendent of operations, Marion L. Fort; and auditor, R. L. Frizell.

The Industrial Fuel Supply Co. was incorporated in 1919. It was a non-utility wholesale gas transmission system, which owned and operated natural gas transmission lines connecting with most of the gas producing fields in California.

Its main transmission line is a 26-inch line over 200 miles in length extending from Kettleman Hills to the city limits of Long Beach, Calif.

■ ■

Southern California Utilities Reduce Rates $800,000

Rates of the Southern California and Southern Counties Gas Companies, the two natural gas utilities serving the Los Angeles area in Southern California, have been reduced by a total of $800,000 annually, according to an announcement last month. F. S. Wade is president of both companies, which are subsidiaries of Pacific Lighting Corp., San Francisco.

The rates of the Southern California company will be reduced $500,000 annually, effective with bills rendered on and after February 1, 1941, stated Commissioner C. C. Baker of the California Railroad Commission. Customers of Southern Counties Gas Co. will receive reductions in their bills, totaling $300,000 annually, according to Presider Ray L. Riley of the California Railroad Commission. The new rates will become effective with bills dated January 15 and thereafter.

■ ■

Pittsburgh Appliance Men Observe "Night of Light"

Gas appliance dealers of Pittsburgh, Pa., left their lights on from dusk until midnight on Christmas Eve in observance of a "Night of Light."

Mayor George H. Lysle had proclaimed that all business houses, office buildings, industrial plants and homes in the city be fully illuminated as a "symbol of freedom," and as a contrast to the blackouts of Europe. And carollers thronged through the bright streets singing in a spirit of thankfulness.

CAN YOU LAY PIPE CHEAPER THAN THIS?

		COST
43 feet	2-inch pipe	$4.50
83 feet	2-inch pipe	8.70
40 feet	3-inch pipe	4.05
17 feet	4-inch pipe	14.50

● These figures, taken from the files of a large gas company, are the actual cost records of pushing pipe with Greenlee Hydraulic Pipe Pushers—cost of digging small trench for the pusher and the setting up of the pusher not included. These pushes were all made in very hard soil under concrete pavement where tearing up the concrete would have increased the cost 10 to 20 times. But with the Greenlee Pusher only a short trench was needed, one or two men to pump the handles, and the pipe was easily pushed to the exact spot required. The cost of cutting pavement, excavating, back-filling, tamping, and repaving was eliminated. This portable pusher, easy to carry from job to job and easy to set up and operate, can save you time and money on every pushing job. Write today for complete details.

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One of the Largest Manufacturers of Gas and Oil Burners in the world manufactures a

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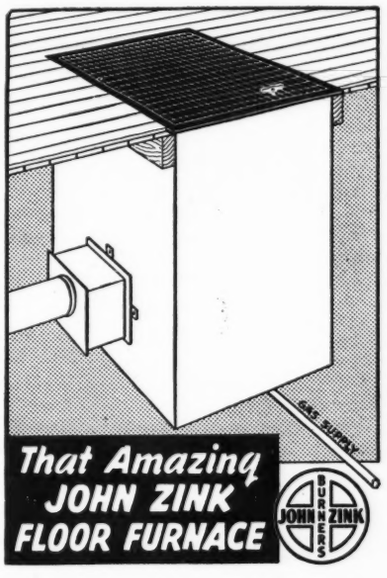

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●REYNOLDS builds an approved Regulator for every type of Gas Control Installation. Approved by the records of performance in actual operation, or by records of factory tests on new developments, every REYNOLDS REGULATOR, regardless of its field, whether for High or Low Pressure, is not only approved but a proved product.

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High Pressure Service House Regulators: Straight Lever Type—Models 10-20 Series. Toggle Lever Type—Model 30 Series.

Low Pressure Service or Appliance Regulators.

District Station Regulators. Single or Double Valve. Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators—Pilot Loaded—Pilot Controlled.

Toggle Type Regulators. Single Valve. Double Valve. Triple Outlet.

Seals: Dead Weight or Mercury.

Relief Valves: High or Low Pressure.

Back Pressure Valves. Automatic Quick-Closing Anti-Vacuum Valves.

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CURRENT *Reading*

Technical

Experiences in the Cathodic Protection of Submarine Pipe Lines — G. N. Scott. *California Oil World*, Oct. 2, 1940, pp. 37, etc. Sea water is corrosive to iron and its degree of corrosivity is indicated by the life of from 8 to 12 years of heavy-weight pipe in submarine service. Since the electrical protection of submarine pipe lines and other metallic structures submerged in sea water is so economically attractive, it is the purpose of this paper to discuss a number of cases of marine corrosion in which the corrosion has been allayed through the powerful medium of the electric current.

Technical Folders — Published by Koppers Co., Pittsburgh, Pa. Proper Coal for Gas Plants (C-4); Phenolate Gas Purification for Removal and Recovery of Hydrogen Sulfide (D-4); Purification System for Liquid Hydrocarbons (D-9); Seaboard Gas Purification Process (D-10); Gas Dehydration Process Using Solid Absorbent (D-5); Modified Thylox Purification Process for Low Sulfur Gas (D-1); All-Iron Gate Valves (BD-1).

New Recycling Plant in La Rosa Field Has Unusual Operating Features — Neil Williams. *Oil and Gas Journal*, Oct. 10, 1940, pp. 81, etc. Incorporated in Coronado Corp.'s natural-gasoline and recycling plant in La Rosa field, Refugio County, Texas, are various features of design and operation, which, in their application to such installations, represent distinct innovation. Through them a higher recovery of marketable products, greater flexibility in distillation and control of types and specifications of products, and generally increased efficiency in processing and conservation of gas are expected to be made possible. These features are described.

American Apparatus, Instruments, and Instrumentation — R. H. Miller. *Industrial and Engineering Chemistry*, Anal. Ed., Oct. 15, 1940, pp. 571-630. Author visited as many plants as he possibly could and learned by correspondence from others something of the progress in instruments. This issue is devoted to his report. There are obvious reasons why it could not be complete, but an effort has been made to find new things as well as to discuss older ones that have proved their value in service.

Underground Surveying and Directional Control of Drilling Wells — W. A. Sawdon. *California Oil World*, 2nd Oct., 1940, pp. 16, etc. Author discusses: Underground surveys; Controlled vertical drilling; Limited inclination drilling; Controlled directional drilling.

Procedure for Cleaning Slotted Liners Developed in California — T. P. Sanders. *Oil and Gas Journal*, Oct. 3, 1940, p. 40. A recently introduced procedure for cleaning slotted liners has shown conspicuous success on many of the 180 California wells on which it was used. The new method combines both mechanical and hydraulic action.

Relationship of Current Density to Cathodic Protection—W. F. Rogers. *Petroleum Engineer*, Oct., 1940, pp. 156, 157. Laboratory and field tests indicate current density is better criterion of protection on bare or poorly-coated pipe than pipe-to-soil potential.

Unusual Testing Methods Used in Texas Recycling Project — George Weber. *Oil and Gas Journal*, Oct. 31, 1940, pp. 48, 50. At its recycling plant in the Grapeland field of East Texas, Lone Star Gas Co. carefully checks the plant's operation by periodic determinations of the gas volume and distillate content of the gas produced by each well. In order to facilitate control and testing, all wells are equipped with special surface connections that permit detaining a representative sample of gas-liquid mixture.

Pressure Data Obtained With Formation Tester Now Form Basis for Accurate Well Analysis — W. A. Sawdon. *Petroleum Engineer*, Oct., 1940, pp. 55, 56. Complete records of pressure data aid in predicting well performance, plotting pressure contours, and serve as guide in shutting-off water.

Primary and Secondary Recovery Methods Increase Yield from Producing Properties — H. L. Flood. *Petroleum Engineer*, Oct., 1940, pp. 39, 40. Gas-repressuring is being applied in many smaller fields; Waterflood is successful method but there is dearth of properties that may be profitably exploited.

Temperature Measurement and Control — M. F. Behar. *Instruments*, Oct., 1940, pp. 294, etc. Part 2 — Industrial Pyrometry. Industrial pyrometers are usually classified as (1) thermoelectric, (2) radiation, (3) optical and (4) fusion. The first three classes in their industrial forms, are made up with scales across which pointers travel. The fourth class comprises pyrometric cones. Industrial pyrometers may be classified also into (1) thermoelectric, (2) "hand" and "visual" radiation and optical, (3) autometric and autographic radiation and optical and (4) fusion. Author discusses in detail thermoelectric pyrometry.

Fundamentals of Diesel Heat Recovery — G. C. Boyer. *Power*, Oct., 1940, pp. 70, 71. The two-thirds of a diesel's fuel input that "goes up in smoke" offers tempting opportunities of the B.t.u-minded engineer. Author gives the basic data needed to figure waste-heat-recovery possibilities.

Temperature Measurement and Control — M. F. Behar. *Instruments*, Sept., 1940, pp. 230-261. Part 1. Temperature measurement foundations; classifications of temperature instruments; the measuring properties of temperature instruments; mercury-in-glass thermometry; solid-expansion thermometry; pressure-spring thermometry; resistance thermometry.

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with the new Klixon Electric Gas Valves

Perfectly silent—no humming, no chattering, no sticking. And quick-acting, sure, positive. Klixon Gas Valves are Thermally operated—operated by a scientifically-calibrated thermostatic disc. No fussy parts. No solenoids. Come with "puff bleed" standard—or "constant bleed" at no extra cost. Current consumption is only 5 watts when open. And a simplified arrangement for manual opening with automatic recycling upon power resumption is available at slight extra cost.

All sizes—⅜" through 1½" I. P. S.—*at new low costs.*

Also available in sets with distinguished Klixon room thermostats.

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Modern Trends in Nickel Steel and Cast Iron Gear Materials — C. M. Schwitter. *Development and Research Division*, The International Nickel Co., Inc., 67 Wall Street, New York, N. Y. — a 16-page brochure giving detailed technical information on the metallurgical and physical characteristics, machinability, heat treatment and related properties of wrought alloy steel gears and alloy cast iron gears. Available from the International Nickel Co. on request.

Exploration Geophysics — J. J. Jakosky. First Edition, 1940. Published by Times-Mirror Publishing Co., Los Angeles, Calif.

General

Wartime Control of Prices — Charles O. Hardy; 216 pages; cloth; charts; published by the Brookings Institution, Washington, D. C.; $1.00. Presents findings of an investigation undertaken at the request of the War Department and financed by the Falk Foundation of Pittsburgh. Text comprises a thorough study of experiences in World War I, and indicates the nature of the problem in all its broad and varied aspects. Indicates that large government purchases in wartime, business expansion, and speculation in commodities tend to create price disturbances, while price advances are stimulated by uncoordinated government buying, competitive bidding for labor, expansion of consumer buying power, expansion of bank credit, and increased rapidity of spending. Cites steps essential to price control and explains why a "price ceiling" is unsatisfactory. Required reading for modern business men.

How to Train Men Quickly — *Management Information*. Published by the Elliott Service Co., 219 E. 44th St., New York, N. Y. This is a series of articles in a weekly foremanship bulletin and a large part of it is devoted to the training of supervisors and foremen.

Industry's Challenge to Research — Bert H. White, vice president, Liberty Bank of Buffalo, N. Y., and director, The Research Advisory Service. This is a condensed report based on 1042 answers to the question "What new product, process or material might industrial research develop that would be valuable to your industry?" Pages 17-18 discuss fuel and state that the gas industry faces a serious problem in the elimination of organic sulphur from city gas distributed to its customers.

An Outline of Personnel Requirements in the Petroleum Industry — H. T. Wyatt and F. R. Schmieder. *California Oil World*, 1st Oct., 1940, pp. 2, etc. Authors define those personnel requirements to the petroleum industry with reference to the producing and transporting of crude petroleum and natural gas. The part of the petroleum industry which is under consideration is, in simple terms, concerned with three basic lines of endeavor, namely, (1) research, (2) planning, and (3) doing. Authors discuss what they consider educational requirements for the above three divisions.

An Appraisal of Executives' Compensation Plans and a Study of Office Layout and Procedures — Published by the George S. May Business Foundation, 111 S. Dearborn St., Chicago, Ill., and 122 E. 42nd St., New York City. These reports are based on studies of current management problems in American industry and are available free of charge upon request.

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Built for the big job of keeping distribution and industrial lines clean. Extra large filtering area is provided by nine filtering elements, each 1⅜" outside diameter. Elements can be quickly removed for cleaning or replacement. Made in 1½" and 2" standard screwed pipe sizes.

Inlet pressures may range from 8" w.c. to 25 pounds per square inch, with differential pressures of from 0.5 to 27.7 inches w.c. Within these limits the 1½" Filter has a capacity of from 1120 to 21,000 cubic feet per hour, and the 2" from 1750 to 28,600 cubic feet per hour.

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LUBRICATED STOPCOCKS
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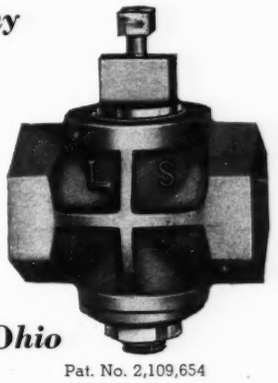

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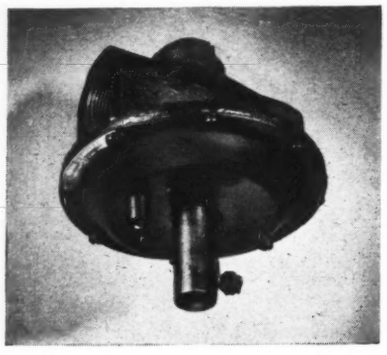
MODERN *Products*

Low Pressure Regulators

General Controls Co., Glendale, Calif.
Model: V-300 Series.



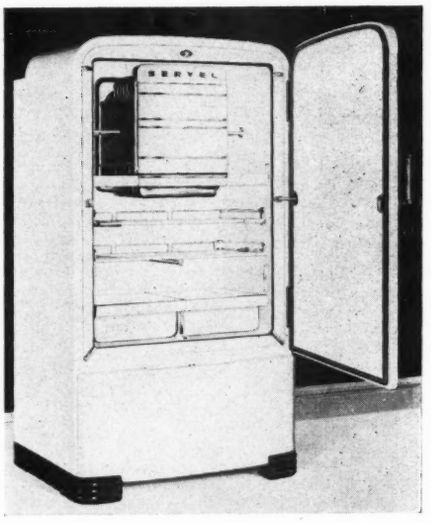
Description: Small, compact regulators available in sizes from ⅜ in .to 1¼ in. with standard outlet pressure sealed at 3½ in. water column, but with a minimum outlet pressure of 2 in. and a maximum of 5 in. water column. All internal parts are resistant to corrosion for all natural and manufactured gases. Small regulator bodies of ⅜ in. and ½ in. are of sand-cast aluminum; larger sizes are of cast iron. Diaphragms are of best grade leather, oil-treated for long life. Rugged single-seated valve principle assures positive alignment and simplified control with a minimum of pressure drop.

Each regulator is tested and checked for setting, leakage, and lock-up, then sealed at the desired pressure. A. G. A. approval has been obtained and the company claims high capacity, close regulation and low cost.

Gas Refrigerator

Servel, Inc., New York, N. Y.
Model: 1941 Electrolux.

Description: Increased ice cube capacity, added shelf area, greater flexibility of storage space, faster freezing of ice cubes, more easily removed ice cube trays and tubes and a newly designed exterior are gas refrigerator items. Interior flexibility is improved by the addition of a second sliding shelf which may be placed in one of two positions to the three position sliding shelf introduced last year. Tilt shelves next to the freezing unit provide extra storage space for small containers or may be tilted back to provide extra storage space for tall bottles. 1940 features such as "dew top" vegetable fresheners, controlled humidity for meat storage, interchangeable porcelain storage

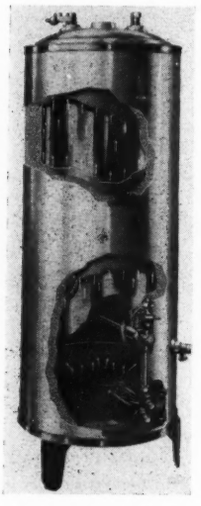


trays have been retained. The newly designed ice cube storage space provides increased net cube capacity at faster freezing. The new storage compartment also offers a larger storage space for frozen foods. A trigger releases the ice cube trays from the freezing unit. A new positive-acting grid and cube release permits removal of ice cubes from the trays individually or all at once. The frontal appearance of the refrigerator has been improved by the addition of stainless steel trim on the front legs and lowering the apron of the small door covering the gas burner.

Water Heater

Ruud Manufacturing Co., Pittsburgh, Pa.
Model: Twelve hundred series.

Description: Unique is the feature of the permanently rust-proof and corrosion-proof Monel tank which is backed by a written 20 year guarantee against failure due to these common causes. Monel is "nature's - alloy," marketed in its natural form. Its physical analysis is fundamentally unchanged from mine to the completed Monel tank. Monel's superior qualities assure a long life in providing a perfect hot water supply. The Ruud Chassis presents features of equal superiority. High heating efficiency is made possible by outer flue construction permitting the maximum of heat absorption area on the sides and bottom of the Monel tank. The time-tested, quick-heat, bunsen-type burner and positive snap-action thermostat combines in a complete and foolproof assembly to give an ever-ready, fully-automatic hot water supply. Gas flow to the burner is further controlled by the automatic gas cut-off which closes both the main and pilot gas valves in case of pilot flame failure. These dual safety controls are known Ruud features.



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Oklahoma Natural Gas Co. Makes Equipment Change

OKLAHOMA Natural Gas Co., Tulsa, Okla., is selling its compressing station in the Chickasha, Okla., field and will operate a new unit at its warehouse a quarter of a mile west of the station north of Norge, Okla., according to O. P. Elkins, field manager for Oklahoma Natural

All units of the large compressing station and auxiliary equipment are being sold to E. J. Cochrane and will be moved to Amarillo, Texas, where it is understood they will be used in a gasoline plant.

Oklahoma Natural has started laying the concrete foundation for a new 300-hp. Ingersoll-Rand compressing unit that will be operated at the warehouse east of the old station. The new unit is capable of delivering 3,000,000 cu. ft. of gas in 24 hours, and is automatically operated.

■ ■

River Valley Gas Co. Sold To Arkansas Western

The Arkansas Utilities Commission recently approved the sale of the River Valley Gas Co., which serves several northwest Arkansas towns, to the Arkansas Western Gas Co. of Fayetteville, Ark., a subsidiary of the Southern Union Gas Co., Dallas, Texas. The price announced was $228,000.

Officials of Arkansas Western testified that their company had entered into an option agreement with the Arkansas-Louisiana Gas Co. to buy up to 150,000,000 cu. ft. of natural gas a year from the latter's western Arkansas fields, in order to insure an adequate supply of gas.

Arkansas Western now serves 3600 customers with gas purchased from fields in Johnson and Franklin counties.

■ ■

Montana Utility Seeks To Issue $10,000,000 In Bonds

The Montana-Dakota Utilities Co. Minneapolis, Minn., has applied to the Federal Power Commission for authority to issue $10,000,000 of its First Mortgage Bonds, the net proceeds from the sale thereof to be applied to the redemption of an equal amount of First Mortgage Bonds now outstanding.

The proposed bonds, according to the application, will be dated January 1, 1940. Bonds proposed to be redeemed are: $8,800,000 of First Mortgage Sinking Fund Bonds, 4½% Series due 1954, and $1,200,000 of First Mortgage Sinking Fund Bonds, 4½% Series due May 1, 1956. These issues are to be redeemed on the earliest possible date in February, 1941.

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Advertising Survey To Be Conducted

A new survey of advertising budgets and their relations to gross incomes will be a major 1941 project of the Public Utilities Advertising Association. The committee undertaking this important study will consist of Henry Obermeyer, assistant vice president, Consolidated Edison Co. of New York, Inc., and Kenneth Magers, advertising and publicity manager, Cincinnati Gas & Electric Co. The work will be carried out in cooperation with the American Gas Association and the Edison Electric Institute.

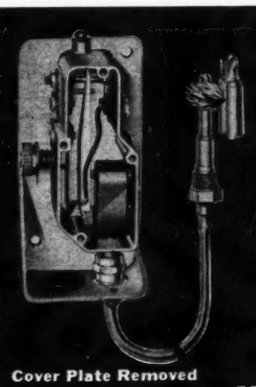
"Pacific" *Forced-Air* Forges Ahead

★ THE RAPID GROWTH in popularity of "Pacific" *Forced-Air* Systems is not the result of high-pressure selling but is the inevitable outcome of owner demonstration of the advantages of forced-air heating and ventilating as expressed by super-fine "*Pacific*" performance.

Filtered air ventilation, summer *and* winter . . . faster room heating . . . better distribution of heat . . . adaptability to installation in buildings with or without basements and with restricted space . . . a flexibility which permits economical solution of architectural problems . . . these factors only have to be brought to the attention of buyers of gas-heating equipment in order to sell an increasingly large number of them on the greater satisfaction to be obtained from "Pacific" *Forced-Air* Heating and Ventilating. Let's cooperate

FOR BETTER BUSINESS

Pacific Gas Radiator Company, Huntington Park, Calif.
Main Office and Factory



SERIES 600 BASO
LINE VOLTAGE • LOW VOLTAGE
AUTOMATIC SWITCH
for
GAS FIRED EQUIPMENT
Write for Complete Information
MILWAUKEE GAS SPECIALTY COMPANY
MILWAUKEE WISCONSIN
Approved

War Relief Exhibit Held By P. G. and E. Families

The Pacific Gas and Electric Co. Unit for Allied Relief, comprising over 100 employes and their families, held a display of their handiwork on the main floor of the company's office at 447 Sutter Street, San Francisco, Calif., on December 19.

The unit, formed August 28, has produced over 500 articles of clothing, under the chairmanship of Mrs. Clea Filsinger. Included were 178 sweaters, 173 dresses for women and girls, 108 baby garments, numerous pairs of socks and other articles of wear. As each member of the group completes 100 hours of sewing or knitting, she is presented with an official Red Cross pin by Harry Bostwick, manager of the San Francisco division. Similar units of PG&E women are operating throughout the northern and central districts.

GEORGE A. BURRELL

Gas Engineer

Design—Construction—Reports
Court Work

Suite 1909
20 Pine Street
New York City

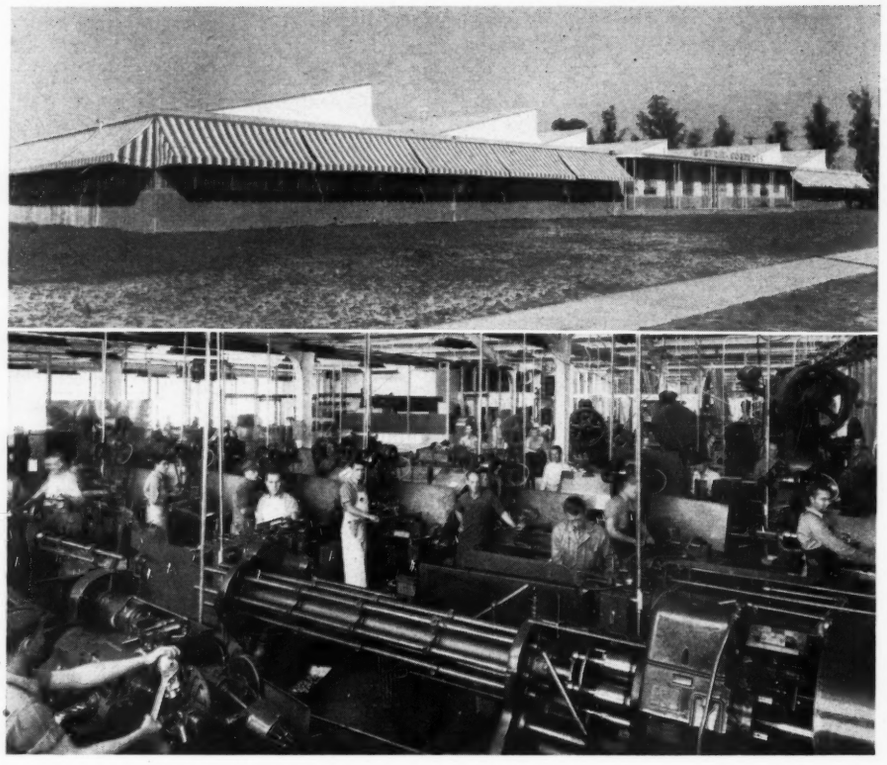
1936-42 5th Avenue
Pittsburgh, Pa.

Fraser Warm Air Heating Units are easier to sell . . . easier to install.

Their advanced engineering and fine materials assure maximum operating efficiency . . . minimum service calls.

Low flame burners, high insulation, and modern eye-appealing cabinets build greater customer satisfaction. Complete assembly, fully wired controls, and other unique Fraser features constantly prove that IT PAYS TO SELL FRASER Furnaces . . . Products of one of the country's largest exclusive makers of Warm Air Heating. Plant capacity doubled in 1940.

FRASER
H. R. BASFORD CO. DISTRIBUTORS
GAS HEATING EQUIPMENT
FRASER FURNACE CO. MANUFACTURERS



The new factory and office of the General Controls Co., located on an 11-acre site at 801 Allen Avenue, Glendale, Calif.

New Office and Factory For General Controls Company

GENERAL Controls Co. has recently removed its offices to a new main office and factory, covering 11 acres, located at 801 Allen Avenue in Glendale, Calif. In the new plant, production facilities are as fully automatic and error free as possible, say company officials.

The equipment consists of fast precision screw machines, lathes capable of turning out the largest jobs required; sanding machines, multiple drill presses, punch presses, complete tool making equipment; testing and research laboratory equipped with pressure and flow test equipment, millographs, temperature recording equipment, refrigeration plant and calorimeter and heating equipment.

General Controls' products are classified as automatic temperature, pressure and flow controls. The line includes products applicable to the control of solid, liquid and gaseous fuels for domestic, commercial and industrial control, heating and air-conditioning. General Controls has pioneered in the manufacture of two-wire solenoid valves in all sizes for the automatic control of gas, oil, air, water, and refrigerants. Another first claimed by the company is the pioneering of remote all-gas actuated controls for domestic air-conditioning, the current for electrical operation of thermostats or limiting devices being supplied by application of the thermocouple principle.

Since its inception, General Controls has been guided by W. R. Ray, vice president, and his two sons, William A. Ray, president in charge of engineering, and Alvin W. Ray, vice president and general manager in charge of production. Through 11 branch offices and adequate distributor representation in the principal cities, the company gives nationwide sales and service on all its products.

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Quarter-Century Club Formed By Hartford Gas Company

The first Annual Dinner of the Quarter Century Club of the Hartford Gas Co., Hartford, Conn., was held December 18, in Hartford. The Quarter-Century Club has just been organized, and only those employes who have completed 25 or more years of active service with the company qualify for membership. President Norman B. Bertolette, as host, welcomed the 33 club members. Henry Sumner had the distinction of being the oldest in years of service.